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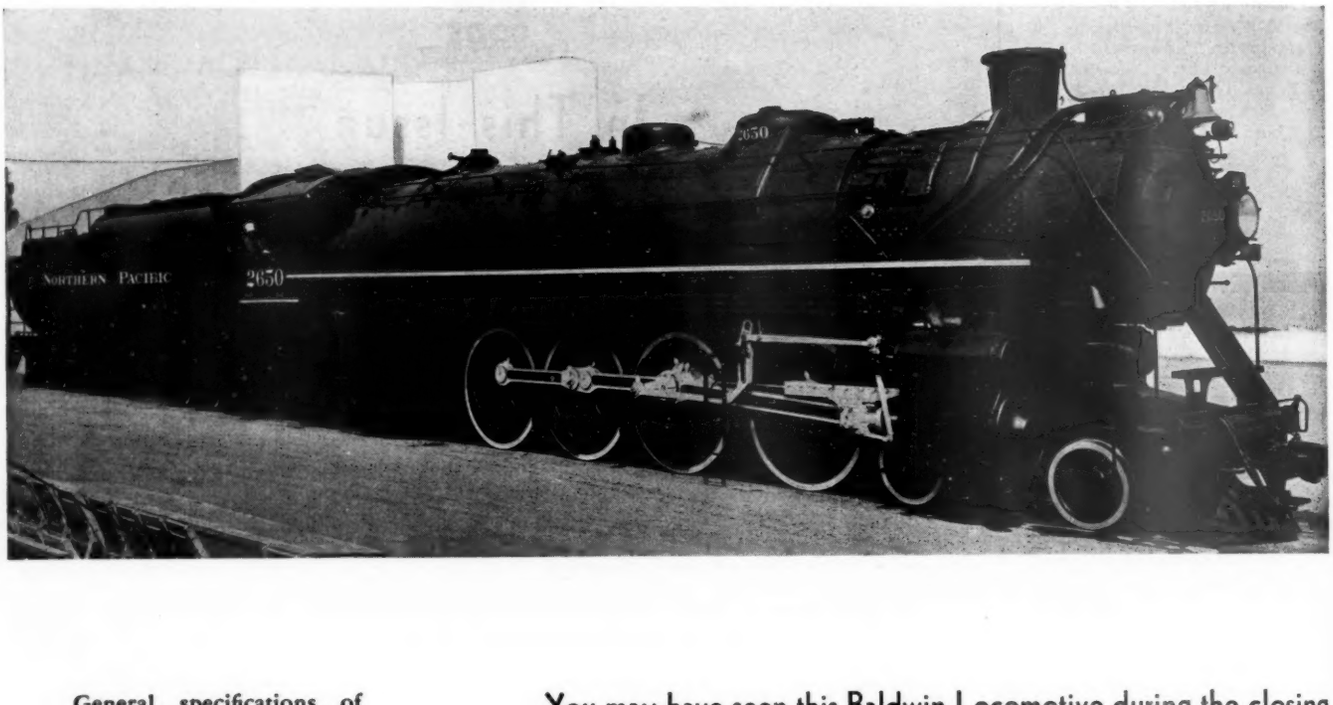
MODERN POWER

for the Northern Pacific



General specifications of locomotive No. 2650, Class A-2.

Cylinders	*28" x 31"*
Steam pressure	*260 lb.*
Drivers, diam.	*77"*
Heating surface	*4964.3 sq. ft.*
Superheating surface	*2174 sq. ft.*
Grate area	*115 sq. ft.*
Weight on drivers	*279,800 lb.*
Weight, total eng.	*489,400 lb.*
Weight, eng. & tend.	*877,000 lb.*
Tractive force	*69,800 lb.*

You may have seen this Baldwin Locomotive during the closing weeks of A Century of Progress Exposition, in Chicago. It is the first of a lot of ten, now under construction for the Northern Pacific Railway.

The new locomotives will haul the North Coast Limited trains between Jamestown, N. D., and Missoula, Mont., a distance of 906 miles and one of the longest engine runs in the United States.

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It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

RAILWAY AGE

A Great Opportunity for a New Association

The Association of American Railroads is now in existence, the formalities necessary to its creation having been performed by the boards of directors and trustees of individual lines. It has come into existence when the railroads are confronted with a crisis that affords it opportunity for very great usefulness.

When consideration of its creation was begun some months ago traffic and earnings were substantially larger than at the bottom of the depression and still increasing. They have since declined until car loadings are now smaller than in 1932 for the first time since April, 1933. The restoration of wages to the highest level in history was agreed to last April upon the assumption that economic recovery and increase of traffic would continue. The advances in prices of equipment and materials due to NRA have been among the results of measures adopted by government and business to promote recovery, but which have helped arrest it. In June, July and August, 1933, railway net operating income was $185,000,000; in June, July and August, 1934, because of increases in operating expenses and a decline of traffic, only $117,000,000, a decrease of 37 per cent; and, although not yet reported, September and October results undoubtedly have been worse even than in 1932 when, instead of declining, car loadings increased 30 per cent between July and October.

The situation presents an emergency. It also emphasizes the magnitude and difficulty of the problem that was presented before this emergency and that will still be presented after it has passed.

Dealing with Railroad Human Nature

The formation of the Association of American Railroads is unprecedented in the history of the railroads excepting, perhaps, by the formation of the Railroads' War Board in 1917. Like the creation of the Railroads' War Board, it is an attempt to leave to the managements of individual lines autonomy in dealing with all matters affecting only themselves while establishing voluntarily an authority that will deal effectively with all problems of the industry. The Railroads' War Board did valuable work the effectiveness of which, however, was impaired by the refusal of some individual lines to obey its orders. The Association of American Railroads has been delegated a power to, in effect, coerce individual lines that the Railroads' War Board did not have.

The success of the new organization will depend as much upon the courage as upon the ability of its directors, executive committee and president. The principal obstacle encountered in trying to attain its objectives will be human nature. Almost everybody is very unreasonable regarding anything that affects his own interest. Human unreasonableness regarding self-interest is the principal cause of the present worldwide depression and its prolongation—perhaps of all the ills of mankind. Railway managers show it like other persons. This, and the fact that they are, and must be, strong individualists, explains why it has heretofore been impracticable satisfactorily to solve many internal problems of the industry. Human nature in railroading has not been abolished by the formation of the new association. Co-ordinator of Transportation Eastman and other persons of influence may yet be so dubious about its ability to cope with human nature as to believe it will be necessary to give power to some government board or official to enforce or overrule its decisions. The exercise of such power by a government board or official would be tantamount to government operation. The association had as well not have been organized if, instead of causing a reduction of government interference, it is to be made a means through which to increase it.

Using New Power

The way for it to reduce government interference and to accomplish all that is practicable under private man-

agement, and more than could be accomplished under any form of government control, is for it to begin at once courageously and persistently to attack both the internal and external problems of the industry with the dual purpose of depriving no railway of present advantages to which it is entitled, but also subordinating unreasonableness dictated by supposed self-interest to the objective of increasing the capacity of the industry to make net earnings.

The vital problem is to increase the net operating income and re-establish the credit of the railway system of the United States. If that is not accomplished nothing will be accomplished. Its accomplishment is a problem for individual managements, but also for the association, which to that end should intelligently and courageously use every legitimate means within its power, whether the opposition it will meet comes from misguided railroad human nature or from outside sources. The railroads have voluntarily given it power. It will have to exercise it without fear or favor if the best interests of the industry are to be served.

The factors in the problem of increasing net operating income are those of reducing operating expenses and increasing the volume of traffic; and they are equally important.

Duplicated Facilities and Labor Costs

The railroads, if they were to be built now, would not provide existing duplications of facilities or service. Competition from without has changed the facilities and service required to enable them, while serving the public adequately and well, to make adequate net earnings for themselves. The passing of the depression and transportation legislation more fair will reduce the existing disparity between railway facilities and traffic but will not remedy it. Many lines and stations should be abandoned. Much service should be pooled or discontinued. If such changes are not initiated by individual lines the initiative should be taken by the association, which should settle differences between competing lines by arbitration if necessary.

Such needed changes cannot now be made without encountering the labor provisions of the Emergency Transportation Act. Therefore vigorous efforts should be promptly made to secure from Congress repeal or modification of these provisions. It is useless to try to effect large economies that will not temporarily affect employees. On the other hand, any measure that prevents real economies must, in the long run, injure rather than benefit labor, because nearly bankrupt railroads make retrenchments that hurt labor more than any legislation can help it. The reduction of more than 31,000 in the number of employees between June and September immediately following the beginning of wage advances and the passage of the retirement pension legislation shows conclusively how dependent the amount of railway employment is upon the amount of net earnings made.

The association has nothing directly to do with labor matters excepting with legislation regarding them, but conditions of employment and wages present a problem which will have to be faced squarely again before next spring unless traffic begins again substantially to increase. As long as traffic continues at its present level the railways cannot afford to pay present wages, much less increase them. Little help in solving the problem presented can be afforded by advances in rates unless and until further increases in commodity prices make more traffic able to bear higher rates. Operating expenses lower in proportion to the volume of traffic are the immediate necessity; and if volume cannot be increased labor and other operating costs will have to come down.

Problems of Outside Competition

The association as well as the individual railways must tackle vigorously the problems, legislative, technical, operating and service, presented by outside competition. Research, propaganda and presentations to legislative bodies should be more energetically used to arrest government expenditures that increase competition in transportation and in behalf of legislation to equalize the terms of such competition. The direction and in a large measure the conduct of such activities are naturally functions of the association.

Whatever may be accomplished by these means, however, the railways will continue to be subject to much outside competition. They will have to meet it by reducing their expenditures for competing with one another, and improving the facilities and reducing the cost of the service used by them individually and jointly against other carriers. This will present problems to be studied and dealt with not only by individual railways, but by almost every division of the new association under the supervision of its directors, executive committee and president.

A New Industry Spirit

There is a new spirit in the railroad industry and the affiliated railway equipment and supply manufacturing industry. It is manifested by individual railways all over the country that are doing new things or doing old things in new ways. It is manifested by both the railways and the railway manufacturers organizing themselves in new ways and beginning new activities to promote their interests, and especially to protect themselves from attacks by outside interests. The organization of the Association of American Railroads is the most important move made by any great American industry for self-regulation, self protection and self-advancement. Its success will depend upon the courage and effectiveness of the industry's self-discipline, as well as the courage and effectiveness of its resistance to attacks and of its counter-attacks. Too long have the railroads submitted to destructive attacks because individual managements have feared the politicians and aggressive business interests making them. Now that they have an association with officers empowered both

to speak and act for all it will not be so easy in future for predatory politicians and business interests to play them off against one another.

The Magic of Science

The report of the Joint Committee appointed at the request of Co-ordinator Eastman by the Science Advisory Board of the National Research Council and the regional co-ordinating committees of the railroads shows a unanimous agreement that "substantial profit will inure to the railroads and to their continued development as the nation's major transportation facility if a way could be found to permit of establishing and maintaining a research organization competent to deal with the major material problems of common interest." The committee also considers such an agency could be organized so as not to destroy any valuable agencies or contacts which now exist, but to greatly enhance the value of existing agencies. Such a central research organization in the opinion of the committee should not attempt to concern itself with application problems, but with more fundamental problems of common interest.

The report contemplates an organization of research specialists trained in the fundamental sciences. Except for the problem of the so-called transverse rail fissure which apparently loomed large in the thinking of the committee, the report is extremely hazy as to the exact type of problem to be attacked and the kind of results expected from their handling by the central research agency. It leaves some doubt in the mind of the reader as to whether the committee has a clear understanding of the nature of the technical problems, the solution of which requires joint action by the railways. At no point does it indicate a clear appreciation of the fact that the railways are not in the business of producing physical facilities; that with few exceptions they purchase all their materials and facilities from other industries, some of which are organized for the purpose of manufacturing equipment used almost exclusively by the railways.

Aside from the transverse rail fissure the examples of problems which "call for the type of consideration that a research organization would give, are those relating to the prospective use of the various high-tensile-strength, light-weight alloys and steels; many of the problems involved in the possibility of improving the effectiveness of existing motive power or in the substitution therefor of some one of the many forms of internal combustion engine." It would seem that in the case of the high-tensile, light-weight alloys and steels the fundamental scientific research had pretty well served its purpose when the materials had reached commercial development. Their prospective use involves skill in engineering design and in the technique of construction.

This is also true in the case of improvements in the effectiveness of existing motive power. The adaptation of the internal combustion engine to railway use, so far as it affects the design of the engine, is a problem in the field of engine and locomotive builders. About the only contribution that the railways can make to the solution of this problem is to make available the knowledge of operating requirements which must be met by the ultimate successful adaptation.

Each of these problems, as is true in the case of practically every problem calling for new or improved types of facilities, depends on inventive genius and engineering talent for its direct solution. The contributions of science are in the background—not in the foreground.

A central research organization to work on the solution of the material problems of the railway industry can scarcely succeed unless it is broadened to include in its membership all those industries whose products form an appreciable part of the railway transportation machine. This includes the steel manufacturers, the companies devoting themselves to the exploitation of various steel alloying elements, manufacturers of nonferrous alloys, the locomotive builders, the car builders, the manufacturers of internal combustion engines, the electrical manufacturers, companies dealing with feedwater treatment and, no doubt, many others. Then only will the central research set-up be comparable with that controlled jointly by the American Telephone & Telegraph Company and its subsidiary, the Western Electric Company.

A research survey committee, like that already established by the Mechanical Division of the American Railway Association to deal with the problems within the equipment field, can perform an extremely useful function in determining what specific problems are in need of research which is beyond the realm of experimental engineering and in directing attention of agencies already in existence to these problems. These agencies, already available in most of the large industries from which the railways buy their major items of equipment and materials, are better equipped in most cases to undertake fundamental research than a central railway organization could be except at the cost of extensive duplication.

By analogy with the research activities of other industries the real field for research by the railways is in the field of transportation service—the one product which the railways have to sell and the one on the effective development of which their future depends. This is in the realm of economics and applied psychology so far as it is in the realm of science at all. It is a business rather than a material problem. If research in this field brings to light the need for new types of facilities not already available, then inventive genius and engineering design will be required to supply the need, utilizing the materials and facilities which have been made available by the application of fundamental science in a wide range of manufacturing industries.

THE NEW DEAL IN BUSINESS, TH

By Samuel O. Dunn

Chairman, Simmons-Boardman Publishing Company; Editor, Railway Age

THE depression and the new Deal policies adopted about sixteen months ago have precipitated a great and unprecedented struggle in this country between the two economic systems of private enterprise and state socialism. I was among the first in published writings and public utterances to oppose certain important New Deal policies. When I began criticising them the sentiment of business men seemed almost unanimously favorable to them, although they were plainly the negation of the kind of policies for which most business men had professed to stand. Business sentiment now seems almost unanimously unfavorable to them. In my opinion business men will principally determine the outcome of this struggle. Business men never had so much influence in any other country as they have had here. Temporarily their influence may not be as great as in the past, but it is still very great.

Business Men as Promoters of Socialism

I do not feel sure, however, that their influence will be unitedly and effectively exerted against state socialism. A large majority of them have not acted in the past on any consistent principles regarding the relations between government and business, but have favored or opposed important government economic policies almost entirely in accordance with the immediate effects they assumed would be produced on their own business. Apparently many of them at first favored certain important New Deal policies because of belief they would involve use of the regulating, taxing and spending power of the government for their special benefit. Most of them seem to have discovered that the New Deal was unconstitutional and economically unsound only after they found that politicians, labor leaders and reforming brain trusters intended it to curtail or abolish, not increase, profits in any kind of business, and that for the present these classes had more influence with government than business men.

Economic Objections to New Deal Policies

For twenty-five years I have been pointing out that, as illustrated by this recent instance, many business men are the most effective promoters of the socialistic policies that they profess to abhor. If this is to continue to be the case the fight against state socialism already is as good as lost. The system of private enterprise and profit cannot withstand the attacks being made upon it if it is to be defended only by an army the various divisions of which are to use most of their ammunition in shooting one another in the back. The most important question confronting the nation is as to what the real attitude and course of business men are going to be.

Business recovery began naturally in this country in August, 1932, and was immediately resumed after the banking crisis in March, 1933. My opposition to the New Deal from its inception, and my repeated public predictions that it would seriously hinder or arrest business recovery, were based upon more than forty years of intensive study of economic problems of every kind and observation of the interaction of economic causes and effects—a study and observation that covered the entire period of the depression of the nineties, and has been continuous to the present moment. My objections to the New Deal in business from the beginning were in principle the same as my objections to the Old Deal in transportation. As I believe both demand the most serious and thorough discussion, I will venture to state briefly what my principal objections to the New Deal have been.

The Interruption of Recovery

Let me say first, however, that as regards these matters I am not in the least influenced by partisan politics. There is little or nothing in the recent record of any political party which causes me to believe that, excepting under irresistable pressure from intelligent public opinion, it can be trusted to deal strictly on its economic merits with any great economic problem. Let me add further that from the beginning I have blamed business men quite as much as the government and labor leaders for the adoption of NRA policies adverse to recovery.

I objected to NRA because it would increase industrial costs and prices as compared with agricultural prices and the purchasing power of farmers and the general public, and thereby reduce the demand for the products of industry, when continuance of increase of the demand that naturally was occurring was indispensible to recovery.

I opposed the NRA theory that reduction of hours of work and increase of wages in industry without corresponding advances in industrial prices would revive business because this policy would reduce profits or increase losses in industry, and thereby delay revival of the durable goods industries in which the severest depression and unemployment existed and all buying from which is done directly or indirectly with the profits made by other industries.

I opposed the Securities Act because of its manifest tendency, like that of NRA, to hinder the raising of capital with which to increase buying from the durable goods industries.

I opposed huge expenditures upon public works because the depression was due to a decline of buying and investment in private business, and I was sure that buying and investment in private business would be hindered by the government taking immense sums from private business in taxes and interfering with the raising of private capital by taking immense amounts of capital out of the market by the sale of government bonds, especially when a large part of the money raised was to

* An address delivered before the Illinois Chamber of Commerce at Chicago on October 19.

S, THE OLD DEAL IN TRANSPORT*

If Railroad Bankruptcy and Government Ownership Come They Will Be Due More to Business Men Who Profess to Abhor Socialism Than to the New Dealers, Many of Whom Desire to Help the Railways

be spent upon projects to destroy private investment and profits.

I was opposed to the NRA policies of reducing competition and increasing regimentation in business because I believed that competition was a necessary stimulant of private enterprise, and that private enterprise, neither favored in any of its branches by government subsidies nor shackled by government interference excepting to keep it honest, was necessary to the restoration of prosperity. I was opposed to inflation and its attendant devices for artificially increasing prices and repudiating debts, because I believed that this depression, as experience had shown was true of all previous great depressions, was due to economic, not monetary, causes —to maladjustments in production and distribution that developments beginning in the late summer of 1932 had shown were being corrected—and that tinkering with the currency would delay or arrest the readjustments and consequent recovery that had begun.

Well, we have now tried the New Deal for sixteen months. On the record of developments, who has been right? Between July, 1932, and July, 1933, before these New Deal policies were in effect and despite the banking crisis early in 1933, freight car loadings, the best single measure of the total volume of production and commerce, increased almost 30 per cent. In August, September and October, 1933, immediately following the beginning of the New Deal, they declined. During the next five months, under the stimulus of huge and indiscriminate government spending, they again increased, but since March they have again been steadily declining.

Since July they have been less than in 1933; and because, whereas in the fall of 1932 they were increasing at an unprecedented rate, while recently they have been declining, they are now actually as small as in October, 1932, and, unless their decline is arrested, will soon be smaller than in 1932. And this although immensely larger government expenditures for public works and relief are being made than in 1932. These facts leave no question as to the effects of the New Deal policies carried out during the last sixteen months. Excepting for the banking crisis early in 1933 and the New Deal the improvement begun two years ago undoubtedly would have continued without serious interruption to the present time as it has in England and we would now be well out of the depression.

This interruption of recovery in the United States has greatly aggravated the seriousness of the problems with which we were confronted. It presents us with the question of what we are going to do to renew recovery. While it has made business and professional sentiment almost 100 per cent adverse to the New Deal, it has increased and intensified radical sentiment among the working classes, and the poorer classes generally, as is strikingly illustrated by the progress of Upton Sinclair's EPIC program in California.

Business Men as Well as Government Responsible

Who is responsible for this interruption of recovery? Who is responsible for the unprecedented and alarming popularity of socialistic proposals?

Both as a student of economics and as a business man I assert that the New Dealers, labor leaders and socialist agitators are only partly responsible for the extremely serious existing conditions and problems; that business men as a class have a heavy responsibility for them; and that unless business men as a class clean their own house, ceased to be governed, as so many of them have been and still are, by the most inconsistent and short-sighted selfishness, begin to take a broad view of governmental and economic problems and to stand up and fight intelligently, consistently, honestly and courageously as a single army for the application to all business of the policies of government and the economic principles in which they constantly and loudly profess to believe, recovery in this country will be long delayed, and a full restoration of the system of private investment and reasonable profits for the legitimate conduct and efficient management of all or any private business may become impossible.

To some these may seem hard words about business men. To some they may seem a direct incitement to increased attacks upon business. Some may say that I speak so strongly regarding these matters because I have been so long identified with the railroad business which has been the principal victim of specific socialistic policies initiated, sponsored and promoted chiefly by professed opponents of such policies in general.

Allow me to say, then, in passing, that I have spent most of my working life among business men, that few intimately know more of them, large and small, than I do, and that no one has a higher respect for their ability, work and achievements as a class. Whatever may be their shortcomings, business men (with whom I include professional men) provide the brains, ideas, initiative, stamina, driving force, that have caused most of the economic progress and increase in wealth, income,

necessities, comforts and luxuries that have occurred in the world. Without them most of the brain trusters and socialistic labor leaders and wage-earners who condemn and covet the profits of business would be starving. Seldom are business men rewarded for their efforts out of proportion to their contribution to the public welfare; and I am so strongly opposed to socialistic policies of every kind because, by invariably reducing the opportunities and incentives of business men, large and small, such policies hinder the economic progress upon which the welfare of all depends.

Will Business Men Become Consistent?

But, at the same time, I have seen too much of business and business men to have any illusion that, in their everlasting struggle to reduce losses or increase profits, most of them usually show much knowledge of or respect for economic principles or much foresight regarding the long-range effects of the things they advocate or do; and I am very earnest and sincere in my conviction that private business in this country is confronted with a crisis that it can weather only by beginning to see itself as others see it and to act accordingly; that its critics and foes see plainly the inconsistencies in which many business men involve themselves by trying, for their short-sighted selfish purposes, to make fish of their own business and flesh of other people's business; and that no greater service could be rendered to business in general than by the saying and doing of things which would cause business men as a class to begin now really to believe in their own professed principles of government and economics and to battle in solid phalanx for their application to all business instead of deserting, as so many of them do, like undisciplined and unorganized mercenaries, to their radical and socialist enemies every time they are offered some socialistic policy which they believe will enable them to gain a temporary advantage or profit at the expense of the public or of persons and investment devoted to other kinds of business.

Are the business men who in the past have promoted whatever socialistic policies they have considered in their own immediate selfish interest, regardless of all broad and far-reaching considerations, going to begin consistently to stand and fight for their professed principles and policies of less government in business, less subsidies in government and equal and unfettered opportunity for all honest private initiative, enterprise and investment? Upon the answer to that question depends, in my opinion, whether the tide of state socialism will be turned back or will roll on until it engulfs all American business.

I could cite, and on other occasions have cited, many illustrations from numerous fields of this tendency of many business men to promote every kind of socialistic policies for their own supposed interest. I must on this occasion, however, because of limitations of time, draw such illustrations only from the field of transportation in which socialistic policies are the most rampant, and in which there will soon be afforded an important test of the sincerity of many who professedly oppose the New Deal because of its socialistic tendencies. For we are immediately confronted with the question of what we are going to do about the Old Deal in transportation as well as the New Deal in business. Congress and the state legislatures at their approaching sessions will consider legislation to reduce the subsidies of carriers that compete with the railways and to equalize regulation of all carriers. This legislation will be supported by everybody with enough political and economic intelligence to realize that the system of private enterprise and profit must be maintained as an entirety if at all.

Encouraging Attitude of Administration

I confidently believe that federal legislation to help equalize the terms of competition between the railways and other carriers is favored and will soon be advocated by the Roosevelt administration. I believe this because the Roosevelt administration apparently sees that past New Deal policies have not promoted recovery and is willing and anxious to have business offer it more constructive policies. Its acceptance and successful support of the National Housing bill, which is not subject to any of the criticisms of other New Deal policies, has illustrated this. I believe it will likewise support fair transportation legislation because of its plain necessity as a means of helping promote economic recovery; and we shall have presented a singular spectacle indeed if such legislation is not supported or is opposed by business interests and other spokesmen that profess to be opposed to the New Deal in business for the precise reasons that constitute the strongest arguments in favor of changing the Old Deal in transportation.

Among the principal issues involved in the controversy over the New Deal are whether there shall be general government regimentation of business; whether the government shall directly or indirectly engage in competition with its citizens; whether the taxpayers shall be further burdened with continued large government expenditures upon unneeded public works; and whether wealth and income shall be redistributed by limitation or abolition of business profits.

In no other industry are these questions presented so acutely as in the transportation industry. Unless they are answered as regards that industry in accordance with sound principles it may be impossible for general railroad bankruptcy and government ownership to be avoided. If railroad bankruptcy and government ownership come, they will be due much more to business men and politicians who loudly profess to be opposed to socialistic policies than to the New Dealers, many of whom seem really to want to help the railways at this most critical juncture in their history.

The railroads are our most regimented industry. They ask that comparable regulation be applied to them and their competitors by water, highway and air. And what, meantime, is being done by many business men and spokesmen of business who oppose the New Deal? While professedly advocating reduction of all regulation of business, including railways, rather than increase of regulation of other carriers, they are urging the Interstate Commerce Commission to refuse to allow the railways to make an advance in freight rates. Furthermore, representatives of other carriers that oppose regulation of themselves are constantly appealing to the Commission to prevent the railways from reducing their rates to meet unregulated competition.

Now, without discussing here the economic desirability or undesirability of an advance in freight rates, I ask you: Could any regulation of railways be more drastic than refusal by government to allow them to readjust their rates, whether upward or downward, as their managements believe required by conditions? Would not the spokesmen of any other industry denounce as economically unsound and unwarranted any kind of government regulation that completely deprived its management of opportunity to readjust its prices in accordance with conditions and the management's best judgment? How much confidence, then, can be placed in the sincerity of those who inveigh against regimentation of business, and profess to favor reduction of railway regulation rather

than increase of regulation of other carriers, but at the same time advocate government regulation to protect unregulated carriers from the railways and to prevent private management of railways from exercising its best judgment in trying to increase its revenues?

Many opponents of the New Deal proclaim that the government should not engage in competition with its citizens or subsidize competition with them. At the same time they continue to advocate and secure large government expenditures for the construction and maintenance of waterways and highways to subsidize competition with the railways, and even regard with tolerance government operation of a barge line in direct competition with the railways.

Both Opposing and Promoting Government Competition

How can anybody oppose the Tennessee Valley project and at the same time advocate construction of the St. Lawrence so-called "seaway"? And yet it is being done. The National Coal Association is carrying on propaganda against the Tennessee Valley and other government projects to generate electricity by the use of water power instead of coal because they are economically unsound and socialistic and will reduce the demand for coal. I am in sympathy with the Coal Association's propaganda, but upon what governmental and economic principles consistent with their own propaganda do coal mine operators act in promoting waterway development to enable coal to be handled largely at the expense of the taxpayers instead of at a smaller total cost of transportation, but entirely at the cost of the shippers, by rail?

When the operators of private power plants object to the government engaging in competition with them, I am reminded that the president of one of the largest power companies in Texas some years ago became president of the Trinity river association to promote large government expenditures to enable transportation upon that river, at very excessive cost to the taxpayers, to take traffic from the railways. He is now struggling to prevent the government from engaging in competition with his own company. If he is beaten I shall find it hard not to rejoice that prompt and appropriate retribution sometimes overtakes those who try to get the government to ruin other people's business by measures soon applied to their own.

And when did the members of manufacturers' associations throughout the country that are protesting against the government engaging in competition in manufacturing become so opposed to the government engaging in competition with private business? Many manufacturers are still actively promoting direct or indirect government competition with the railways at the expense of the taxpayers to enable them to sell more trucks or to ship at rates lower than the total cost of transportation. Chicago is the hotbed of opposition to the New Deal, but some Chicago interests that are inveighing loudly against the government engaging in competition with its citizens elsewhere are seeking large government expenditures upon the Calumet-Sag channel to enable Chicago shippers better to use the Lakes-to-the-Gulf waterway and the government's barge line upon which so much money already has been wasted. In general they are clamorously opposed to socialistic policies and very solicitous for the taxpayers, but as regards particular expenditures and projects which may advantage them—well, they consider the New Deal is a monstrous thing, excepting when it can be used to raid the public treasury to help Chicago help ruin the railroads.

Many opponents of the New Deal say that government expenditures upon unneeded public works should be stopped. No government expenditures upon unneeded public works have been so large as those upon highways and waterways, but, although transportation is our most over-expanded industry, such expenditures are being continued under pressure from manufacturers of road building materials and machinery, buses and trucks and other business interests that are in full cry against the socialism of the New Deal. The Chamber of Commerce of the United States has gone on record as being opposed to continuing large government expenditures upon unneeded public works, but its president, Henry I. Harriman, is advocating the construction of the St. Lawrence seaway.

The ruthlessness with which many business interests that profess to be opposed to certain policies of the New Deal promote the continued application of similar policies to transportation without any regard whatever for the interests and rights of railway investors and employes or for the public welfare sets a glaring example of inconsistency, short-sighted selfishness and hypocrisy that labor leaders and socialist agitators may justifiably and effectively use in attacking private business and the profit system.

And How About Profits?

And how about profits? The profit system is under attack, but not merely by New Deal reformers and exponents of socialist-labor economics. I agree that the system of private ownership and management of property cannot survive without the maintenance of opportunity for private business to make profits in proportion to its progressiveness, efficiency and honesty. But that principle obviously is as applicable to the railroads as to any other industry. Nevertheless business men who inveigh against government policies to limit or abolish profits in the supposed interest of wage earners have been engaged for a quarter century, and are still engaged, in using the power of government to restrict or destroy railway profits in their own supposed interest.

Joseph B. Eastman, Federal Co-ordinator of Transportation, has borne the reputation of being a "radical," he has advocated and predicted government ownership as the ultimate solution of the railroad problem, and yet even he considered it necessary in an address before the Chicago Association of Commerce last week to warn business men that they must let the railways earn reasonable profits in order to maintain private ownership. Could there be a more significant commentary upon the inconsistency between the professed principles and the actual practice of many business men? The railroads long have needed and still need protection from business men who have wanted them regulated and competed with in the supposed interest of business more than they have needed and now need protection from avowed advocates of government ownership and socialism.

Twenty-four years ago business men got Congress to pass the Mann-Elkins Act empowering the Interstate Commerce Commission to prevent proposed advances in rates, and then got the Commission to rule against a proposed 10 per cent advance in freight rates. And upon what ground? Why, upon the ground that it would make railway profits unnecessarily large. That was the real beginning of government regulation of business profits in this country. Business men continued their campaign against railway profits by promoting passage of the LaFollette valuation law in 1913, the express purpose of which was to provide a measure and basis for limiting railway profits; and I have personal knowledge that the leadership in this campaign against

railway profits was taken by business interests of Chicago and the state of Illinois.

Chicago is the greatest railroad center in the world and owes more to the railroads than to any other single industry. Illinois not only has good railroad service afforded by a large mileage of line, the operation of which involves large employment and expenditure in this state, but in addition has perhaps the largest industry devoted to the manufacture of railway equipment and supplies of any state, and in addition the railroads are very large customers of its coal mining industry. Nevertheless, during most of the last twenty-five years the railroads and the affiliated railway equipment and supply manufacturing industry have been almost constantly the objects of destructive attacks by an important part of the business interests and press of Chicago and Illinois.

I am glad to say that the Illinois Chamber of Commerce never has participated in this campaign. It has been, however, a campaign which, by helping to cause a reduction of hundreds of millions of dollars annually in railway expenditures for employment and materials and equipment, has probably done more harm to the business of Illinois than to that of any other state.

Business's Selfish Campaign Against Railways

Business interests have continued their selfish campaign against railway profits down to the present time by promoting government expenditures upon highways and waterways and preventing adequate charges for and regulation of their use with the result of diverting large amounts of earnings from the railways and causing a vast volume of traffic to be handled largely at the expense of the taxpayers. And when the railways find it difficult to meet unfair competition created by these socialistic policies these same business interests criticise railway managements as "inefficient" and say they would not have lost so much traffic and earnings if they had been as enterprising and progressive as their subsidized and unregulated competitors. It has become the fashion for numerous business men and newspapers, who either do not know the facts or willfully distort them, to assert that the main trouble with the railways is that they have been "asleep."

I have had some opportunities to observe the way in which various important industries have been managed, and I challenge as unfounded this implication that railway managements have been less progressive or efficient than those of other industries. I am not much impressed with the kind of management some of our important industries have had, either during recent years of prosperity or the more recent years of depression, and I think that the managers of all industries might profitably benefit at present by recalling the tradition that the streets of Jerusalem were kept clean by every man sweeping in front of his own door. I have repeatedly presented data elsewhere and could present it here proving that the railways have been developed and operated as efficiently, have improved their service as much and been financed as conservatively during the last twenty years as any other large American industry.

But suppose this were not true? Would that be justification for our national and state governments, under pressure from business interests, practicing wholesale discriminations against citizens because they happen to own, manage and work for railways? Are they not as entitled to fair treatment by their governments as any other citizens? The critics of the system of private enterprise and profit put all of our industries on the spot for alleged lack of progressiveness, efficiency and regard for the public welfare; and if such unsupported charges are to be accepted and disseminated by business as justification for government regimentation of and competition with some industries why should they not be accepted by a majority of the people as justification for socialization of all industries?

The plain fact is that this propaganda that the railways' difficulty in meeting competition has been due to their own mismanagement has emanated from manufacturers of trucks and other business interests that are using and want continued unfair and socialistic government policies by which they think they benefit. Those who oppose equal government treatment of all carriers betray thereby their fear that under equal terms other carriers could not meet railway competition. Their fear is justified. But is the probability that, if all carriers were treated alike by the national and state governments, the railways would recover a large part of the traffic they have lost, justification for continuing policies of treating them unfairly? When did it begin to be considered fair in this country to reproach an industry as inefficient and unprogressive as an answer to its demands for the same fair and equal treatment from government to which, in their preachments and resolutions at least, all business men agree that all industries are entitled?

Many business men have criticised railway managements because of their failure successfully to resist demands of organized labor backed by government. Many business men are now opposing advances in freight rates upon the grounds that the railways should not have agreed recently to advance wages and that higher rates will retard improvement of business. Well, just how successful, may I ask, have many of the same business men been recently in resisting similar demands of organized labor backed by government, and what have they done about prices in the face of increased labor costs?

I have believed and have repeatedly said for more than a year, and I still believe and say, that to increase wages, production costs, prices and freight rates just when recovery is beginning is not the way to get out of a depression, but the way to start a new one, but I also say that for business men who already, under government and labor union pressure, have raised wages, production costs and prices, including prices that the railways have to pay, to inveigh against the railways for trying to save themselves from bankruptcy by seeking an advance in rates, is on a parity with the consistency shown by these same business men in advocating the application to other people's business of every socialistic policy that they believe will benefit them, and then patriotically declaiming themselves hoarse about the destruction of American constitutional and economic institutions when it is proposed to apply similar policies to their business.

There are several vitally important factors involved in the railway problem. The railways have a huge investment which is represented by billions of dollars of stocks and bonds outstanding in the hands of savings banks, life insurance companies and the public. Should this investment and these securities be further jeopardized by the application to the railways of government policies such as every business interest denounces as unfair when applied to itself? The railways have about 700,000 employes out of work who when employed are among the best paid working men in the country. Should the unemployment of a large part of these men be perpetuated by government policies that unfairly discriminate against them and their employers? In the years 1925-1929 the railways made purchases averaging $1,-

(*Continued on page 504*)

What Motive Power for High Speeds?*

A study of main line and suburban passenger trains to determine relative operating costs with steam, electric and oil-electric motive power

By G. I. Wright† and P. A. McGee‡

HIGH-SPEED passenger trains have of late received great publicity and although there are many interesting developments and designs under way which propose to develop lightweight equipment with high-strength materials, the application of internal-combustion motive power and radical equipment outlines, there has been little if any published analysis of the motive power requirements and economies involved in running trains of various sizes and weights at high speeds, say from 70 to 125 m.p.h.

The first step necessary in such analysis is to establish rational definitions for the most important dimensions of a train. The quantity of passenger transportation produced is usually expressed in passenger-train miles or car miles. When it is recognized that trains may vary in length from 50 ft. to 1,500 ft. and cars from 50 ft. to 80 ft. with corresponding variations in weight, it is seen that these indices give no real measure of transportation. "Passenger-seat miles" is equally unsatisfactory as the linear space occupied per seat varies from 9 in. to 2 ft. or over.

The motive power supplies energy to accelerate a train, to overcome air and frictional resistance and to ascend grades. Air resistance at any speed is a function of the cross-section area and shape of a train together with its length, while frictional resistance is proportional to weight. Accelerating and gravity forces on grades are also proportional to weight. Remembering that the motive power itself usually occupies some of the total train length, we then have four important physical dimensions of a passenger train as follows:

1—Total length, including that of the motive power unit.
2—Net length available for passengers, mail or baggage.
3—Average weight per foot of gross length.
4—Average weight per foot of net length.

Tractive Resistance Values

With these ruling dimensions we are in a position to study the effects of train shape and weight on the tractive resistance of any length train running at any practicable speed.

We will consider both conventional and lightweight rolling stock. With each we will assume two types of construction, namely conventional design and revised design with specially shaped ends which cause a considerable reduction in head-end and tail-end air resistance.

With these two types of trains and two end formations, tractive resistance values for any length train may be calculated according to recognized formulae. Appendix A (omitted) including Table IX, gives the principal data of types of rolling stock and weight characteristics of different types of motive power. From this data tractive resistance values are developed which are shown on Curve 1. This curve has been prepared to show readily effects of coach cross section area, shape of ends, weight per foot and train length on total train resistance.

In Curve 1, total tractive resistance is represented by formula $R = A + BV + CV$.[2]

The top portion of the curve gives constant resistance A commonly called "journal resistance." This constant resistance is given on a weight per foot and length basis. The weight per foot is the average weight for the total train and the length is the total train length including motive power.

The centre set of curves gives variable friction factor B commonly called "flange resistance," which varies as a function of the speed. This resistance also is given on a weight per foot and length basis.

The bottom portion of the curve gives air resistance factor C for various train lengths of four different types.

Due to the possibility of irregularities occurring in air coefficients with trains shorter than 100 ft. this is the minimum length shown. It should also be noted that Curve 1 does not attempt to give air resistance factors for radical stream-lining.

The air resistance with conventional coaches and specially shaped train ends and small-size coaches with special train ends are shown in Table I as a percentage of the conventional standard-end train.

Table I—Percentage of Air Resistance per Foot with Different Type Coaches

Total train length	Conventional coaches		Small-size coaches special ends
	Standard ends	Special ends	
100 ft.	100	53.4	46.6
500 ft.	100	73.4	57.8
1,000 ft.	100	83.4	64.6

The reduction in air resistance per foot by increasing the length of train for both standard and special-ends is shown in Table II.

Table II—Percentage of Air Resistance per Foot with Different Length Trains

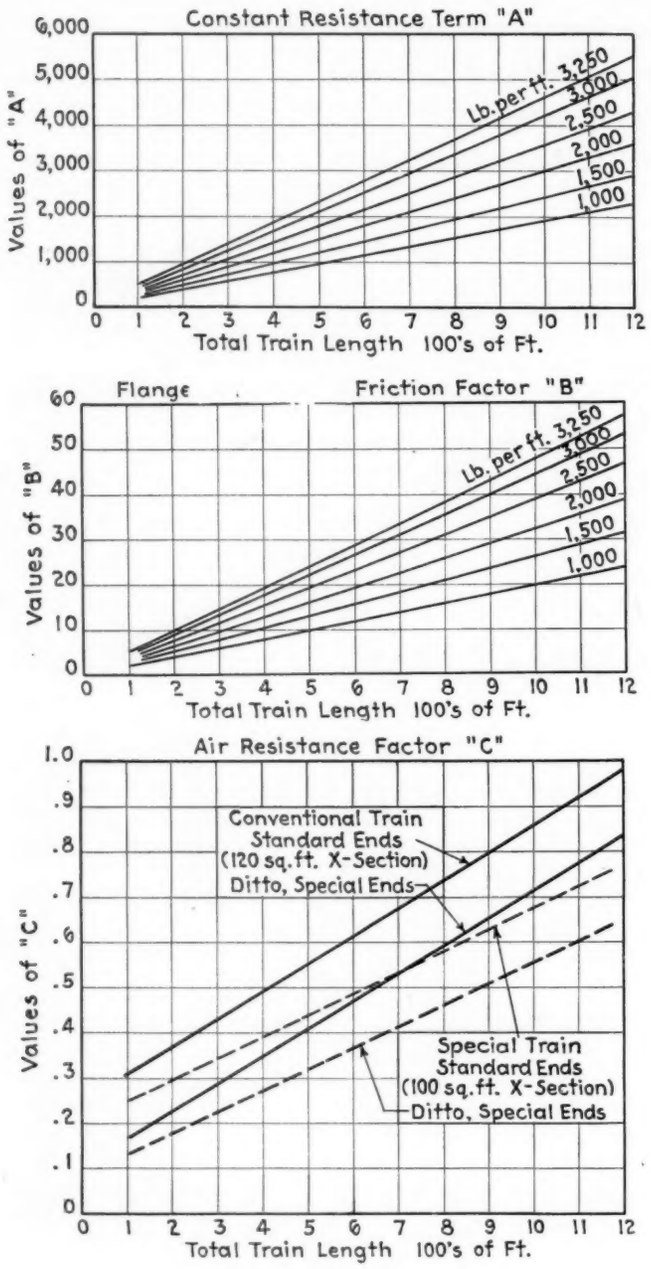
Total train length	Train with standard ends	Train with special ends
100 ft.	100	100
500 ft.	36.7	44.6
1,000 ft.	28.0	40.5

Reduction in air resistance obtained with reduced-size coaches and special shaped ends may possibly be increased by refinement in train surfaces, attention to shape and connections between coaches. Such further reduction, however, cannot be considerable, as resistance caused by eddies along the longitudinal surfaces of the train which is the principal force affected by formation and shape of train sides, is relatively a small part of total train resistance.

With due allowance for increase in friction coefficients

* Abstract of a paper presented before the New York Railroad Club, October 19, 1934.
† Chief electrical engineer, Reading Company.
‡ Assistant engineer, Reading Company.

with decrease in axle load, the reduction in journal and variable friction resistance is considerable with reduction in weight. As an example, consider a conventional steam train with an average weight of 3,000 lb. per gross foot and a total train length of 600 ft. in comparison with a light-weight electric motor-car train weighing 1,250 lb.



$R = A + BX + CV^2$
R = Total resistance, lb.
V = Speed, m.p.h.

Curve 1—Train Resistance Values

per ft. and having an overall length of 500 ft. At 100 m.p.h. total friction resistances of the two trains are:

Conventional steam train	5,280 lb.
Light-weight electric train	2,300 lb.

The difference of 2980 lb. at 100 m.p.h. represents practically 800 hp. and this saving is directly obtained with light-weight motive power equipment and light-weight coaches.

Consider now the air resistances of these two trains of 600 ft. and 500 ft. respectively at 100 m.p.h.:

Conventional steam train	6,000 lb.
Light-weight electric train	3,150 lb.

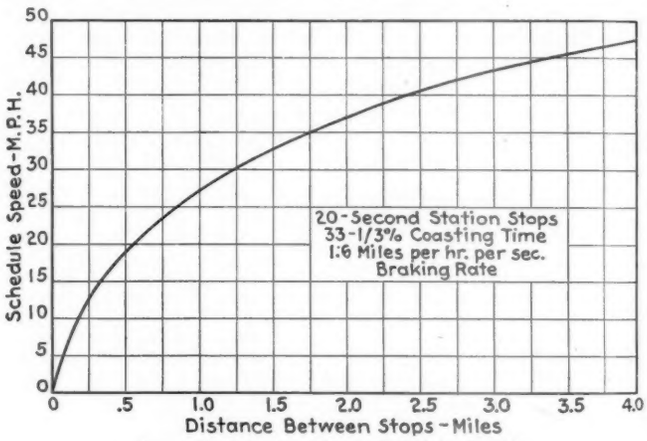
The difference of 2,850 lb. at 100 m.p.h. represents 760 hp. which is actually less than the saving obtained with reduced friction resistance.

From these considerations it may be concluded that the most practical way to reduce train resistance at high speeds is to run trains at maximum length, i. e., consolidate as many trains as possible into one, reduce the cross section to a minimum and reduce weight to a minimum. Where, however, high speeds are required with trains of short length the shaping of the front and rear ends is important. Effects of tractive resistance on varying train length can be best illustrated by considering horsepower requirements per foot of net train lengths at various speeds.

Train Characteristics

The most important operating indices of main-line trains with comparatively long distances between stops and few slow downs are free running speed on level tangent track, free running speed on the ruling grade and the rate of acceleration at high speed. These three indices explain the operating possibilities of any main-line train with a given permissible maximum speed and rate of braking.

With all types of motive power the initial rate of acceleration is limited only by adhesive weight. As the

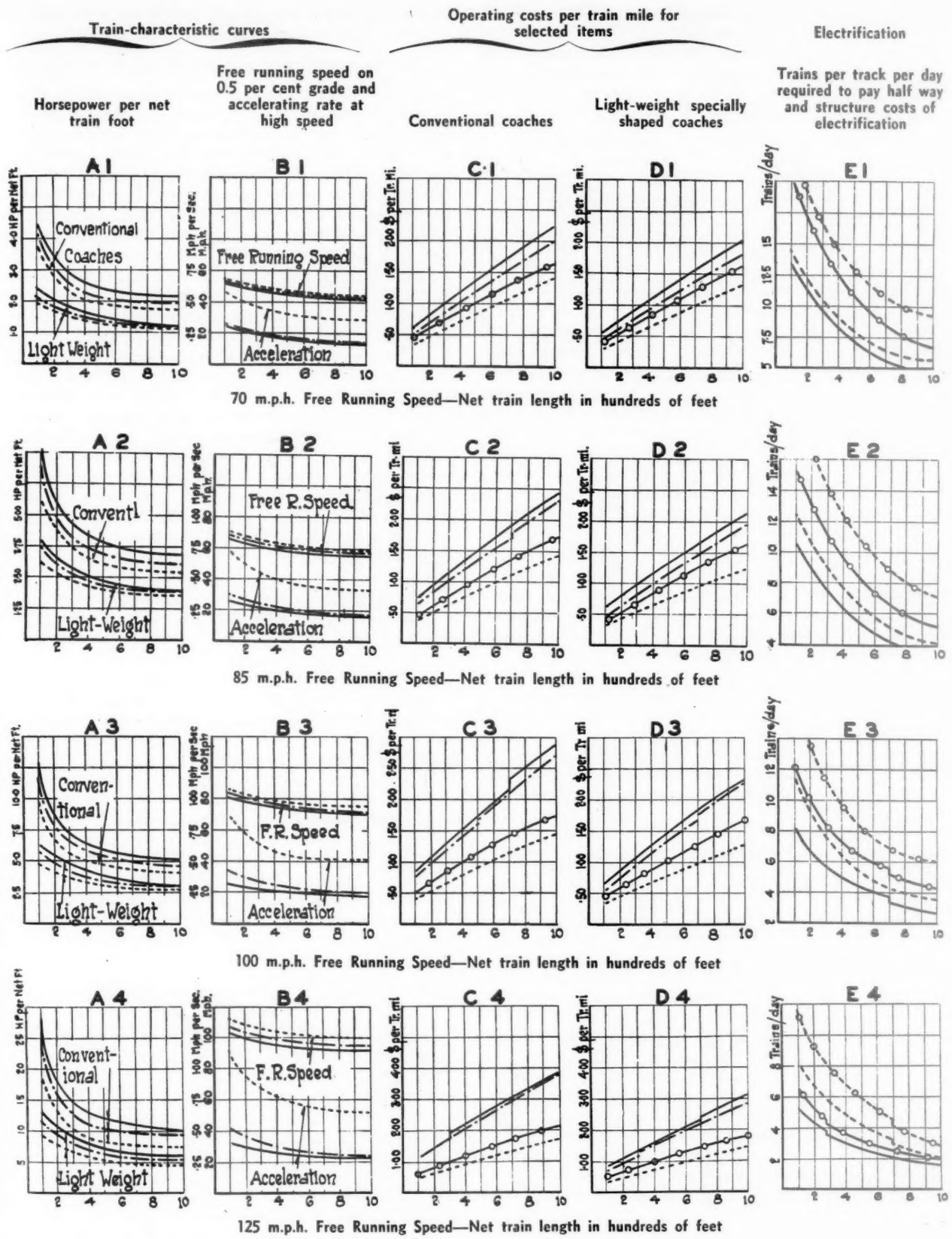


Curve 2—Suburban Train Schedule Speeds

speed of a train increases, however, the rate of acceleration is limited by the available power, which in the case of the steam locomotive is boiler capacity; in the case of oil-electric, the shaft horsepower, and in the case of electric, the available power of the distribution lines. With electric power supplied from a large available source of energy, it is normally possible to carry the initial rate of acceleration to quite high speeds, the only limitation being adhesive weight. In order fully to exploit this available energy with electric power it is necessary to use as much of the total train weight as possible for tractive adhesion and in consequence it becomes desirable to distribute the traction motors throughout the train, or in other words, employ distributed motive power.

With these considerations in mind the most instructive analysis and comparison can be made with (1) head-end steam power such as employed with conventional steam trains; (2) head-end electric power such as employed on main-line trains; (3) distributed electric power such as employed with suburban motor-car trains, and (4) distributed or concentrated oil-electric power built into the train or coach structure.

All further considerations will be confined to two types of coaches, namely, trains with conventional coaches and standard-shaped ends and trains with small-



CURVES A, B, C AND D

- Steam power
- Electric distributed power
- Electric head-end power
- Oil-electric power

CURVE E

- Electric distributed power, conventional coaches
- Electric distributed power, with light-weight specially shaped coaches
- Electric head-end power, conventional coaches
- Electric head-end power, with light-weight specially shaped coaches

Curves A, B, C and D

size coaches and special-shaped ends. These are the two extreme cases shown on Curve 1.*

Table IX in Appendix A, gives dimensions and weights of motive power and coaches considered. For ready reference the coach weights may be retabulated as follows:

Motive power		Coaches without equipment	
Type	Class	Weight per ft.	Type
Steam	Head-end	2,000 lb.	Conventional
Steam	Head-end	750 lb.	Special shaped
Electric	Head-end	2,000 lb.	Conventional
Electric	Head-end	750 lb.	Special shaped
Electric	Distributed	1,400 to 1,500 lb.	Conventional
Electric	Distributed	700 to 750 lb.	Special shaped
Oil-electric	Built into coach	1,500 to 1,700 lb.	Conventional
Oil-electric	Built into coach	700 to 800 lb.	Special shaped

We will develop characteristic curves of horsepower required per net foot of train length for the three types of motive power and two types of coaches to obtain free running speeds on level track of 70, 85, 100, and 125 m.p.h and further show the free running speeds on a ruling grade of 0.5 per cent and the rate of train acceleration in miles per hour per second on level track at the speed where the electric power would normally commence to decrease its horsepower output. It should be noted that the horsepower considered is at the rims of the driving wheels which should not be confused with steam-locomotive indicated horsepower or oil-electric shaft brake horsepower.

Curves marked *A* show required horsepower per net train foot at the driving wheels to obtain the free running speed considered. These curves do not show values for head-end electric power which lie between the steam and oil-electric curves at 70 m.p.h. free running speed and on or slightly below oil-electric curves at the other speeds.

Table III shows effects of length on horsepower which may be read from the *A* curves. With a 500-ft. train the required horsepower per net foot varies between 44 and 60 per cent of that required with 100-ft. trains. With 1,000-ft. trains the required horsepower per foot is between 36 per cent and 58 per cent of the 100 ft. train.

Table III—Effect of Net Train Length on Required Horsepower per Foot

Net train length	Horsepower as a percentage of 100-ft. train
100 ft.	100
500 ft.	44 to 60
1,000 ft.	36 to 58

Table IV shows the marked effect of free running speed on required horsepower between limits shown on the *A* curves for different types of power considered. The increase in horsepower required to increase free running speed from 70 to 125 m.p.h. is, with 100-ft trains, from 5 to 6.3 times and with 1,000-ft. trains from 4.2 to 4.6 times. To increase a train's free running speed from 70 to 85 m.p.h., or from 85 to 100 m.p.h. would require an increase of from 50 to over 70 per cent in the motive-power rating.

Table IV—Effect of Speed on Required Horsepower per Net Foot Horsepower is Referred to that Required at 70 m.p.h.

Speed	100-ft. train	500-ft. train	1,000-ft. train
70 m.p.h.	100	100	100
85 m.p.h.	150 to 170	150 to 157	150 to 155
100 m.p.h.	256 to 295	250	230
125 m.p.h.	500 to 634	430 to 500	420 to 460

In order to interpret properly the characteristics shown on the *A* curves, it is necessary to consider the free running speed of the various trains on some ruling grade which we are taking at 0.5 per cent and also to note the rate of acceleration at high speeds.

Free Running Speed and Acceleration at High Speed

These values are shown for various trains and train lengths in the *B* series of curves. Since there is little difference between conventional and lightweight trains, only one curve is shown for each type of power. Free running speeds and rates of acceleration shown on the *B* curves were obtained by assuming the same horsepower as shown on *A* curves with the exception of electric power accelerating rates where a horsepower output 65 per cent greater than that shown on the *A* curves is assumed. This is the normal overload taken by electric motors during accelerating periods. Values for head-end electric power are not shown as they are practically the same as for distributed electric power.

Referring to series *B* curves, there is a gradual decrease in the free running speeds on the 0.5 per cent grade with increase in train length. The drop in free running speed is a maximum with trains of lowest free running speed on the level.

Rates of acceleration shown by the lower series of *B* curves, at the speeds selected, decrease with increase in train length and increase with increase in train free running speed. Speeds at which rates of acceleration are given are as follows: *B1* curves, 30 m.p.h.; *B2* curves, 38 m.p.h.; *B3* curves, 45 m.p.h.; *B4* curves, 55 m.p.h.

The relatively low rates of acceleration with steam and oil-electric power which are never above half those obtained with electric power, is a characteristic difference between self-contained motive power and motive power connected to a large source of power.

In many main line services the accelerating rate at high speeds and free running speeds on grades are more important than the ultimate free running speed on level track. Under such conditions air resistance values and streamlining are of relatively small importance and this explains why tractive resistance formulae which give widely different values result apparently in similar overall train performances.

In a general study of relative train performance it is difficult to include these variable factors as they are the result of local conditions which vary in each case. In consequence we will confine further considerations to the *A* curves and compare relative train performances on the single power requirement to obtain a free running speed on level track.

Operating Costs

The most satisfactory evaluation of the characteristics shown on the *A* curves may be obtained by considering operating costs of such items as are affected by the type of motive power.

The *A* curves give power requirements in horsepower per ft. of net train length. There is, of course, a great lack of flexibility in motive power, particularly when concentrated at the head end, as there is just one train size where motive power is operated at maximum efficiency. With distributed power, which is shown for electric operation on the *A* and *B* curves, there is considerably more flexibility, but here again, the exact assignment of power will be dictated by the minimum size train which it is proposed to operate at any given free running speed. Under normal operating conditions it would not be possible to secure the exact required motive power and generally it may be expected that an excess will be obtained, just as obtains today with the average steam train. In this estimate, however, it will be assumed that the theoretically exact power require-

* With steam and electric head-end power coach weights are taken as 2,000 lb. for conventional and 750 lb. for special shaped; for electric power distributed power an average of 1,450 lb. and 725 lb. respectively and for oil-electric power 1,600 lb. and 750 lb.

ments as shown in the *A* curves, are obtained and all cost data is made on this basis.

The most important items of operating cost which are effected by size, speed, shape and motive power of trains are: Fuel and power, crew, train supplies, terminal charges, engine house, maintenance and fixed charges.

Detailed estimates of operating costs are explained in Appendix *B* (omitted). Estimates are primarily for comparative purposes and are not exact for any particular application. Certain expenses which are common to all trains are not included in costs considered. Costs taken represent values which may be obtained on a road having a fairly level profile with a medium traffic density. Little is known regarding first cost or maintenance cost of equipment which may be operated at speeds over 100 m.p.h. so that values given for very high speeds must be looked upon as approximate estimates. With oil-electric equipment no standards have yet been established and weights and costs may be considerably affected by future developments. This reasoning also applies to some extent to other types of power.

Curves *C* and *D* clearly show the necessity of considering train size and free running speed in connection with operating costs. They also bring out the great economy secured with large-size trains. Comparison of *C* and *D* curves shows that the saving per train mile with light-weight special-shaped trains is small at low speeds. The effect of speed on operating cost is very marked with both steam and oil-electric power. Table V shows the effect of speed between the two extremes considered with both conventional and light-weight special-shaped trains.

Table V—Operating Cost per Train Mile

	Free running speed 70 m.p.h.				Free running speed 125 m.p.h.			
	100 ft.		1,000 ft.		100 ft.		1,000 ft.	
Type and class motive power	Conv.	Lt.wt.	Conv.	Lt.wt.	Conv.	Lt.wt.	Conv.	Lt.wt.
Steam head end	$ .62	.58	2.24	2.04	1.20	.82	3.87	3.15
Elec. head end	.44	.40	1.65	1.60	.64	.49	2.115	1.80
Elec. distributed	.33	.30	1.41	1.32	.49	.36	1.72	1.45
Oil-electric	.51	.46	1.99	1.82	1.18	.72	3.86	2.86

Savings indicated with electric power over steam are what would normally be expected at the free running speed of 70 m.p.h. The remarkable economy obtained with electric power at higher speeds, however, is probably not generally appreciated, especially with distributed electric power. Further experience is required with oil-electric motive power before a satisfactory comparison can be made with steam operation.

Traffic Density to Justify Electric Operation

Since electric power is inherently the most economical for train operation and is preeminently satisfactory where very high speed is required, it is of interest to know the required traffic density to justify the large expenses necessary for transmission and distribution systems required with electric power. With main-line electrification it will generally be found that the factors which favorably affect passenger trains apply with equal or even greater force to freight trains. We may, in consequence, consider that half the way and structure charges are applicable to passenger train movements.

Transmission and distribution costs on main-line roads vary according to the voltage class of the system and availability of electric power. A high capacity transmission and distribution system could be installed today for about $25,000 per track mile. In connection with electrification new signals and communicating circuits are usually installed and certain alterations to bridges and structures are frequently required. Costs for these latter items may in the case of suburban electrifications amount to as much as transmission and distribution costs. With main-line electrification, however, these latter costs should be well covered by a round figure of $10,000 per main line track mile. Total costs included in way and structure accounts for electrification per main line track mile would then be as shown on Table VI.

Table VI—Transmission and Distribution Costs per Main Line Track Mile

1—Transmission and distribution costs	$25,000.00
2—Associated costs	10,000.00
3—Total way and structure costs	35,000.00
4—Yearly interest at 5 per cent	1,750.00
5—Yearly deprec. and taxes on trans. and distr. system	875.00
6—Yearly operating and maintenance	350.00
7—Total yearly charges way and structures	2,975.00
8—Deductions, maint. water and coal stations and enginhouses	150.00
9—Net yearly way and structure charges	2,825.00
10—Net daily way and structure charges	7.74
11—Half daily way and structure charges	3.87

The *E* series of curves show necessary daily passenger train density per main line track to justify electrification on the basis of costs shown in Table VI. Table VII gives in tabular form the train density required with 500-ft. and 1000-ft. trains at free running speeds considered to justify electrification. This tabulation, together with the *E* curves, shows clearly the effect of increasing the speed of passenger trains. An increase in speed of trains is in effect an increase in density as far as power requirements and operating costs are concerned. The density with conventional coaches required to justify electrification with 500-ft. trains varies from a maximum of 10.5 trains per track per day with head-end power at 70 m.p.h. free running speed to a minimum of 2.7 trains per day with distributed electric power at 125 m.p.h. free running speed. This comparison is made entirely on the basis of horsepower requirements to obtain a given free running speed. Where speed restrictions and intermediate station stops control a main-line schedule the traffic density required to justify electrification might be considerably less than shown on the *E* curves and Table VII. This feature of train operation is best explained by considering the case of suburban movement where accelerating rates are of such importance.

Table VII—Passenger Train Density to Justify Electrification

	Trains per track per day							
	Conventional trains				Light-weight trains			
	500-ft. trains		1,000-ft. trains		500-ft. trains		1,000-ft. trains	
Free running speed	H. end power	Distr. power	H. end power	Distr. power	H. end power	Distr. power	H. end power	Distr. power
70 m.p.h.	10.5	7.0	6.7	4.7	12.6	7.6	9.1	5.6
85 m.p.h.	8.4	5.5	5.2	3.7	10.9	6.7	7.2	4.3
100 m.p.h.	6.3	4.4	4.3	2.7	8.2	5.4	6.0	3.6
125 m.p.h.	3.2	2.7	2.1	1.7	6.0	4.4	2.9	2.3

Suburban Traffic

In suburban service, the accelerating rate is the all important factor in economic operation at any given schedule speed. Maximum speed must, however, also be considered. In order to accomplish some maximum suburban run in a minimum time it is necessary to attain some maximum speed and in order to accomplish some minimum or average run in a minimum time it is necessary to have some definite rate of acceleration.

The important indices of suburban equipment are, then, maximum permissible speed and average rate of acceleration to some critical speed. With some of the latest suburban equipments installed, these values are of the order of 70 m.p.h., and 1.25 m.p.h.p.s. to 30 m.p.h.

The schedule speed characteristic of such equipment is shown on Curve 2 This curve gives the schedule speed in m.p.h. for any length run up to four miles with 20-sec. station stops and 33⅓ per cent coasting time. The purpose in introducing this characteristic curve is

to establish some basis for comparison with different weights of coaches and types of power.

The motive power required for suburban trains is based primarily on weight and to fulfill schedule speeds shown on Curve 2 an output of 8 hp. per ton is required at the driving wheels of the locomotive or coach. Taking the suburban coach and motive power weights and dimensions shown in Table IX in Appendix A (omitted) with a passenger load of 175 lb. per foot, Table VIII shows required horsepower output per net foot to meet schedules shown on Curve 2.

Table VIII—Suburban Train Power Requirements

	Elec. distr. pwr.		Steam head end pwr.		Oil-elec. pwr.	
	Convt.	Lt.wt.	Convt.	Lt.wt.	Convt.	Lt.wt.
Hp. per ton	8	8	8	8	8	8
Hp. per net ft.	8.00	4.62	18.50	8.80	18.0	7.8
Hp. for 500-ft. train	4,000	2,310	9,250	4,400	9,000	3,900

It would not be economically feasible to employ steam power or oil-electric power of the magnitude shown in Table VIII with conventional coaches and even with electric operation it becomes necessary to distribute the power in order to secure the necessary adhesion without unduly increasing total train weight. In view of these difficulties, suburban trains with steam power do not attempt to meet the schedule speeds shown on Curve 2 and for economic reasons steam schedules are adjusted to the lowest tolerable values.

An interesting comparison may be made between Table VIII and the *A* series of curves. It will be found that the power required to meet suburban schedules shown on Curve 2 exceeds the power required for all train sizes considered in main line service up to a free running speed of 100 m.p.h. and with steam and oil-electric power exceeds that required with 200 ft. trains at 125 m.p.h.

Steam-operated roads have little experience with motive power concentration such as that shown on Table VIII and on the *A* curves for speeds of 100 and 125 m.p.h Electrified suburban systems, however, operate with this power concentration and develop during periods of acceleration peak outputs of 10,000 hp. per train. There is, therefore, no technical difficulty in securing the necessary power for very high speed trains. Very high speed operation is largely a question of economics and public demand and response to such service.

Freight Car Loading Falls Below 1932 Figure

WASHINGTON, D. C.

REVENUE freight car loading, after having been less than that for the corresponding period of 1933 since the first of July, in the week ended October 13 fell below the figure for the corresponding week of 1932. Reports for the first part of January had shown totals slightly below the 1932 level but for the first half of the year car loading was consistently above the corresponding figures for 1932 and 1933. For the week ended October 13 the total was 635,639 cars, an increase of 4,321 cars as compared with the preceding week but a decrease of 35,041 cars as compared with the corresponding week of last year and of 14,051 cars as compared with 1932. Live stock loading showed an increase as compared with the week before and last year, and miscellaneous freight showed an increase as compared with the week before while grain and grain products showed an increase as compared with last year. The summary, as compiled by the Association of American Railroads, follows:

Revenue Freight Car Loading

Week Ended Saturday, October 13, 1934

Districts	1934	1933	1932
Eastern	130,678	139,805	138,256
Allegheny	110,667	125,174	114,462
Pocahontas	44,768	46,827	47,628
Southern	86,420	91,308	96,694
Northwestern	95,439	99,687	81,363
Central Western	111,169	112,599	112,333
Southwestern	56,498	55,280	58,954
Total Western Districts	263,106	267,566	252,650
Total All Roads	635,639	670,680	649,690
Commodities			
Grain and Grain Products	30,601	28,829	33,076
Live Stock	31,433	24,555	24,889
Coal	119,399	130,956	143,712
Coke	5,469	7,037	5,191
Forest Products	21,855	25,087	19,552
Ore	17,934	33,799	7,129
Merchandise L.C.L.	161,451	172,080	176,958
Miscellaneous	247,497	248,337	239,183
October 13	635,639	670,680	649,690
October 6	631,318	662,373	625,089
September 29	644,647	669,186	621,658
September 22	643,120	659,866	595,604
September 15	645,986	660,086	587,246
Cumulative Total, 41 Weeks	24,575,756	22,947,733	22,247,471

Car Loading in Canada

Car loadings in Canada for the week ended October 13 were affected by the holiday on October 8th and decreased from 53,050 cars for the previous week to 51,560 cars, according to the compilation of the Dominion Bureau of Statistics. The total was 1,257 cars greater than that for the corresponding week in 1933.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
October 13, 1934	51,560	18,790
October 6, 1934	53,050	18,832
September 29, 1934	50,547	19,306
October 14, 1933	50,303	18,375
Cumulative Totals for Canada:		
October 13, 1934	1,803,706	886,590
October 14, 1933	1,554,923	752,749
October 15, 1932	1,726,428	779,995

The New Deal in Business, The Old Deal in Transport

(*Continued from page 498*)

300,000,000 annually from the durable goods manufacturers. These purchases have been reduced during the depression by about $1,000,000,000 annually. Are not these manufacturers and their employes entitled to recover as much of their business and employment as would be restored by the adoption of government policies which would treat all agencies of transportation alike?

These are important questions. Back of them, however, is a more important one. To continue the Old Deal in transportation would be to continue certain policies almost identical with some of the important New Deal policies to which most business men violently object upon the ground that by wholesale regimentation of business, putting the government into direct or indirect competition with its citizens, causing large increases in taxes for expenditures upon unneeded public works, and reducing the opportunity to make legitimate profits, they threaten the entire system of private investment, management and profits with destruction and the substitution of some form of state socialism.

The business men of the country can do much to arrest the progress of state socialism by refusing any longer to be governed by short-sighted consideration of

(*Continued on page 507*)

Traffic Clubs Meet at Columbus

The effects of transportation adjustments on the competitive situation were discussed by members

ECONOMIC planning as applied to transportation was the general subject for discussion at the semi-annual meeting of the Associated Traffic Clubs of America at Columbus, Ohio, on October 16-17. The effects of economic planning were emphasized by Dr. Marvin L. Fair, professor of transportation of Temple university, Philadelphia, Pa., who spoke on Competition in Transportation; by Dr. Lewis G. Sorrell, professor of transportation of the University of Chicago, who discussed The Public Trust Idea of Administration; and by Hon. Clyde B. Aitchison, commissioner of the Interstate Commerce Commission, who analyzed British Regulation of Transportation.

Officers reelected for the ensuing year are as follows: President, H. W. Roe, traffic manager, Mid-Continent Petroleum Corporation, Tulsa, Okla.; executive vice-president, J. M. Fitzgerald, vice-chairman, Committee on Public Relations of the Eastern Railroads, New York; vice-presidents, M. M. Goodsill, general passenger agent, Northern Pacific, St. Paul, Minn.; J. T. Saunders, vice-president, Southern Pacific, San Francisco, Cal.; H. S. Snow, vice-president, American Zinc Lead & Smelting Company, St. Louis, Mo.; G. Lloyd Wilson, professor of commerce and transportation, University of Pennsylvania, Philadelphia, Pa.; and C. R. Musgrave, traffic vice-president, Phillips Petroleum Company, Bartlesville, Okla., (elected for the first time); secretary, F. A. Doebber, traffic manager, Citizens Gas Company, Indianapolis, Ind.; and treasurer, W. T. Vanderburgh, commercial agent, Seaboard Air Line, Louisville, Ky.

Competition in Transportation

Professor Fair reviewed competition among transportation carriers in the past and discussed the factors which must be considered in adjusting present forms of transportation to meet shippers' needs and at the same time provide a system which protects the interests of the majority. He said in part:

The issues in this problem of competitive policy are clearly, on the one hand, service, and on the other hand, cost. The shipping public wants the best service possible to meet modern commercial needs and that service at the lowest cost possible. What the shipper really wants, above all, is a rate lower than the other fellow's. He wants competition so he can bargain to advantage in both rates and service. What he is just now coming to see is that the privilege of such bargaining is, in the long run, often directly opposed to low rates and good service.

The individual shipper must come to realize that to a large extent the best transportation set-up for him is the one that is best for all shippers as a group. We have been reminded that our new policies must be directed toward public interest rather than private interest. But how shall we interpret public interest in the light of our experience and our needs? In the last analysis, it is the conduct of transportation service which will best meet the needs of industry and commerce at the lowest possible cost consistent with well-maintained facilities and sound credit standing of the carriers.

The carriers, particularly the rail carriers, must come to realize that enlightened self-interest means extensive co-operation, and joint action and a rise of new facilities better to serve the public.

Modern commerce, for example, requires that its increasing percentage of merchandise traffic be given a completed transportation service, a service comparable to the old siding-to-siding service between industrial plants. This new merchandise service requires motor highway operations, efficient containers, and, to make it financially feasible, joint facilities and joint operation. Whatever the new demands may be for merchandise traffic or for its perishable traffic or passenger traffic—which has also proved to be quite perishable—those demands must be met. If these improved services cannot be performed at low cost by financially sound companies and yet preserve competition, then competition must give way to co-operation and integration.

Reduction in Competition Imperative

The studies of the federal co-ordinator and others on the costs of motor and rail carriers in terminal operation show rather convincingly that these improved services cannot be realized without a reduction in competition. We are told that the road that we must follow leads away from diffusion and complexity and toward concentration and simplification. Competitive advantage and individual interest must give place to a recognition of collective advantage for the industry of which a carrier is a part. Corporate pride must give way to a frank facing of economic and business facts.

When we read in the recent financial reports that 67.4 per cent of our railroads for the first seven months of 1934 found themselves operating at a deficit, it is time that action be taken. Is it going to consist of negative and futile attempts to free the railroads from comprehensive regulation, to set up barriers against the new competitors of the railroads, or to bring about a general increase in the rate level?

Sober reflection over the developments since the passage of the Hepburn Act in 1906 should convince us that the public will have its say. Common sense tells us that the shipper has the right to the cheapest and most efficient service obtainable. He cannot be expected to suspend his choice until motor and water carriers pay a similar scale of wages and are subject to a comparable degree of regulation.

Enlightened self-interest rather would indicate the desirability of accepting the leadership of the division of traffic of the association of railroads to eliminate that competition among railroad carriers that makes them susceptible to the adoption of rates which favor certain large shippers and communities to the great detriment of their earning capacity.

It would also seem desirable to realize at the earliest practicable moment the economies of investment and operation which would be realized with joint development of terminal facilities in all major railroad centers, and with the substitution of motor service for many local freight and passenger operations. The division of planning and research of the Association of American Railroads or the proposed transportation institute, using the valuable data made available by the staff of the Federal Co-ordinator of Transportation, should find the most practicable and effective way of realizing these economies.

However, it is not contrary to the public's interest that, at the same time, the railroads demand that a condition of equality of competition be made possible by the complete abandonment of uneconomic aids and subsidies and the development of comparable schemes of taxation and regulation of other carriers. Even this must be approached in a fair and statesmanlike manner which makes it clear that there is no desire to frustrate the development of any valuable form of transportation.

Cooperation Need Not Eliminate Healthful Competition

Co-operation of the railroads in those operations where greatest economies and improvements of service are possible need not deprive shippers of a desirable and healthful competitive situation. While unification in terminal operations would have to be extensive, competition in long-distance trunk line operation between important centers could be preserved. There is every reason to expect that the co-ordinated rail-motor service of the future will, in every section of the nation face the competition of an all-motor service, which through interchange of freight will give service between any two points.

Competition in transportation is at its best between unlike agencies which compete on an equal basis. It gives the shipper a variety of services. It would not necessitate the duplication of heavy investment in identical facilities. The duplication of

services would probably not be such as to seriously endanger the credit standing and quality of service of railroads or a limited number of motor or water carriers.

The old common law of common carriers allowed the kings to give grant of prescription to protect the ferryman. "If the owner were not allowed a monopoly," we read, "he cannot keep the ferry in a way useful to the public." Yet the courts of the time refused to consider it an exclusive transportation monopoly. Today co-operation and unification of rail carriers, where duplication of facilities and services are greatest, are necessary to keep the railroad useful to the public.

I am perfectly aware of the fact that this new competitive program would constitute the most severe adjustment that any great industry has ever faced. It would involve literally thousands of adjustments in organization, rates and services which to individual railroads and shippers would appear almost impossible.

There can be no sudden revolution in transportation operations. Only carefully thought out plans which take us in the right direction should be followed.

Programs or policies that would not recognize the importance of preserving so far as possible existing trade channels, management controls and corporate investments would not properly interpret public interest. Furthermore, while these adjustments are being made, the flow of traffic must not be paralyzed or even impaired. We cannot shuffle our facilities into one grand heap and then set them up according to an idealistic pattern. Cool thinking is just as imperative in this crisis as vision. For example, we must not adopt a plausible and more or less arbitrary program of consolidation, whether it is the Prince plan of corporate control or any other plan. We must simply seek and pursue better ways of doing things.

We must proceed from the angle of more economic operation. We have heard that old adage that "what is best for the greatest number is the law." We hope it will be so in transportation.

Public Trust Administration

Professor Sorrell described various forms of public trust administration of publicly-owned public utilities in Great Britain and the United States and discussed its important factors. He said in part:

Diverse as the circumstances may be surrounding the creation of trusts, they all appear to have certain uniformities of objective, and even of the methods to be employed in realizing the same.

1. In general they all aim to preserve the advantages of private enterprise along with public ownership of the enterprises themselves. That advantage is quite largely conceived as a large measure of freedom to direct business activities without being subjected to the interference of partisan politics, and free even from legal restraints that are usually conceived to be proper for ordinary government activities. Therefore, they seek to create a managerial directorate that need not obey the dictates of party politicians, as regards services, hiring, discharge, promotions and salaries of personnel.

2. They aim to create a large degree of financial autonomy, or self regulation, financially speaking. The end sought is that the enterprise may be self-supporting as fully as possible; and that the adverse effect upon incentive, of recourse upon the public purse shall not exist. In certain cases the liability of the government for operating deficits cannot be denied; and provision is made therefor. And on the other hand, it is regarded as equally adverse in the effect upon efficiency, if the surpluses earned by such enterprises, are simply covered into the public treasury to make good losses from non-commercial activities of the government. Hence, the public trust idea means self-support but that the enterprise shall not be used as a tax gatherer.

3. It, therefore, follows that advocates of the public trust administration urge "service without profit," and "service at cost," as the objective. In the sense of demanding self-support, but also demanding that such commercial enterprises shall not become a source of taxes, the idea is intelligible. But the term "profit" is too loosely used in ordinary parlance to permit a possible misconception. The professional economist, of course, has a technical meaning for the term; but public usage includes not only true economic profit, but even return on invested capital, and labor. It requires emphasis that the instances of public trust reviewed in this discussion all contemplate returns of 4½-5-6 per cent on all of the capital invested; that such is regarded as part of the cost of operation; and that charges are to be adjusted to produce such returns just as far as possible. Doubtless the railroads of the nation, collectively considered, would be glad to forego profits if they could secure this return upon their invested capital. Furthermore, if the public trust is to stand on its own feet entirely, it certainly must earn profits in good years in order to offset the losses of the poor ones. The complete abolition of profits in public trust industries, i.e., returns over and above a fair rate of interest on invested capital does not appear to be practicable.

4. The public trusts completely disfranchise the private stockholder, even when they retain private financial interests. In no one of the cases reviewed is the private stockholder given a voice in the determination of the board of trustees. For example, in the London Passenger Board and in the Boston Elevated cases the private stockholder continues to hold stocks, but the trustees are named by other groups. It follows that the public trust form tends to obliterate the distinction between creditors and owners, so far as the fixed capital of the company is concerned, for in private corporation finance one of the prominent aspects of such financing was that the creditor, except in bankruptcy, had no right to select the directors, whereas generally speaking the stockholders do. Now abolish the right of the stockholders to select the directors and treat the right to receive dividends as a part of the costs of operation just as is interest on the debt, and the distinction between bondholders and stockholders loses most of the force that it still retains. This is perhaps the most striking difference between the private business corporation and the public trust type of administration.

5. As a corollary of this the public trust idea tends to weaken the idea of management responsible to ownership, and to replace it with the idea of management responsible to some interpretation of the public welfare. In some of these trusts, of course, the public through the government is in reality the owner, through having extinguished all private rights of ownership. In a sense, therefore, the government as trustee for the public holds the stock of the corporation; and as owner, therefore, chooses the directing trustees. And yet even in this case the idea of management responsible to the public welfare is regarded as uppermost rather than the idea of management responsible to the public as owner.

6. Advocates of the public trust also tend to emphasize the idea that expertness rather than political qualifications shall always govern the selection of managers. They are keenly aware of the dangers of the spoil system; and they emphasize that the appointing power, wherever it may be lodged, must choose as managers only those who are truly qualified by training and capacity to manage these public trust undertakings.

Conclusions Varied

I have no dogmatic opinion to offer in conclusion on this question. Among students of public administration one finds enthusiastic pronouncements in favor of the public trust, as the most likely method available for reconciling public ownership and private administration benefits. Others are more cautious, and urge further experiment and study. Many statements have been made claiming that this or that public trust enterprise has enjoyed a long and successful career. But the record is largely devoid of objective tests.

And many reasonable doubts exist concerning the problem. Doubtless many students of economic and political conditions in the United States will doubt whether it is possible by any organization device so to isolate such commercial undertakings under government ownership, that the disintegrating effects of politics (partisan) will not make their presence felt in administration. Nothing less than a complete change in the attitude of those who manage political parties, certainly not merely a change in organization, will suffice to effect this result. They will observe that it is not so much the form of organization called the public trust that is significant, as it is two accompanying assumptions; namely, that only the really qualified man shall be chosen for the position of trust and that being appointed, the executive and legislative branches of the government shall leave him free to administer the enterprise subject only to review as regards general policies. If these two assumptions are not realized, the public trust will fail, no matter how intricate the machinery devised. Opponents of government ownership cognizant of American political traditions will doubt that the first assumption is likely to be realized; and they will point to the difficulty of defining general policies as making the second assumption difficult of realization. They will doubtless continue to feel that the private business corporation, in spite of its abuses, absentee stockholders and even absentee directors, is likely in the long run to be more capably administered than a government-owned enterprise, administered by a public trust owing allegiance to the ill-defined concept of the public welfare.

Organization students will likewise run against the difficulty of reconciling that freedom necessary to avoid political interference, with real responsibility in the organization sense of the term. If the trust is so constituted as to be free from political influences, then how can it be responsible to the public through the government? And if it is made responsible to the public through the government, then how can it be insulated against

undesirable political influences in the management? It is a puzzling question, difficult to answer so long as partisan politics continue to occupy the role in government that they do.

British Regulation of Transportation

Commissioner Aitchison traced regulation of transportation in Great Britain, discussing in detail the Ministry of Transport set up in 1919 and the ministry's study of rates, and compared transportation conditions and regulations in Great Britain and the United States. He said in part:

Generalizations are dangerous, particularly when made from such a distance. If a modest appraisal of the situation might be made, it would be that economic and political forces are combining to evolve transportation companies from the old British railway companies as a basis, with only a modicum of competition remaining, and with the principal businesses under the firm thumb of the Minister of Transport as the delegated agent of Parliament in carrying out broad policies to which it gives voice as the embodiment of the British people.

Without pushing analogies too far, and certainly giving those to whom these words may come in the United States full credit for ability to remember and compare, it seems clear since the outbreak of the World War Great Britain has faced much the same situations as the United States; and barring the recent Road and Rail Traffic Act and the progress toward condensation of competitive activities of a wasteful character, that country is not much closer to a clear solution than the United States.

One simple underlying economic fact universally complicates the problem of reaching a common denominator through coordination. The railway is a complex machine, doing many kinds of business, with fixed costs actually and relatively great, which do not vary with the quantity of traffic. The problem of distribution of its common fixed costs is of utmost difficulty; in practice, it is met by differentiating charges for service upon the principle of "what the traffic will bear" or "the value of the service." In the case of a monopolistic enterprise, such a basis works fairly well and there is no difficulty in determining the value of the service to the patron. He demands that his charges be adjusted on this principle, with due allowance for differing costs of service, with utmost nicety as compared with those of his competitor or other persons. But in the case of a non-monopolistic enterprise, such as a motor carrier, particularly the private carrier, costs are easily ascertained, the fixed cost element becomes relatively less important and the charges are adjusted with particular reference to the direct cost of the immediate service. This is inevitable, for the value of the service to any class of user can never exceed the sum for which he could himself perform the service.

Fine gradations of classification or of charges are impossible when conditions of free competition make it feasible for the patron readily to perform the service at a favorable cost, no matter what the value of the commodity transported may be, and without regard to the urgency for its movement. The cost of carriage by private or contract vehicle tends to become the upper limit of the value of the service to the railway patron, and it directly limits the value of the service when performed by a common carrier trucker. If goods are of high grade, the shipper or trader will evade a demand imposed by a high classification basis of rates and will transport by a cheaper road hauler. The railway thus finds itself left with an ever lower character of traffic, but its fixed costs remain constant, and these it must endeavor to recoup from the business it can retain. In time this must become impossible. The Sphinx has not answered this paradox. Great Britain has not solved it, and the failure of the elaborate rate structure to promote stability and simplicity of railway rates and to yield the contemplated net return to the railways, indicates that the troubles which have attended like noble experiments in this country are by no means unique, and that they are due to something other than casual differences in the forms and extent of regulation.

The question arises whether the experience of Great Britain with a division of the regulatory functions between a cabinet member and various advisory courts or tribunals suggests that the United States should adapt its system to the British model. This question has been raised periodically for at least 30 years. Every time it has been investigated in Congress, the answer has been in the negative. The question need not be asked until it is apparent that because of this difference in organization the British system has achieved a solution of the common problem which defective organization of the American system does not permit to be solved. But Great Britain is still far from settlement of this baffling matter. Nor is there evidence that the British system, by and large, has given greater satisfaction or commands greater confidence as a piece of administrative machinery than does the American system.

The efficient and dignified functioning of the British regulatory tribunals commands the respectful admiration of their American colleagues, but skill in administration does not bear on the question of the best form of organization for administration. The present British system took shape out of the exigencies of war, when concentration of authority and virtual dictatorship were accepted as necessary, and instant action and unquestioning obedience were imperative. It was not a deliberately evolved plan, and today, with many of the former powers of the Ministry taken away, is a house which has been added to until its gables are as notable as its framework. The checks and balances which have been introduced point to an unwillingness to tolerate possible bureaucratic methods of partisan control in matters which are of such a nature that administration must be patient and reasonable, and partisanship excluded at whatever cost. Beneath all this is the fundamental constitutional difference between Great Britain and the United States, expressed in the phrase, the supremacy of Parliament, and the widely different position of the British minister and the American secretary of an executive department. Basically, the question is whether the agency is to be responsible primarily to Congress, or to the executive.

That question forces itself into attention in America, but it has hardly theoretical interest when as in Great Britain the Minister is, in effect, the arm of the Parliament of which he is a member. Railway regulation, whether rates are being fixed or the rules of conduct prescribed for the future, is primarily a legislative function, and it is not executive or administrative. The American regulating commission becomes the administrative agent of the Congress, just as the British minister is of Parliament.

The experiences of the great nation which we have watched with sympathy show that the difficulties of the enormously important problem of fair relations between competing forms of transport, their patrons and the state, are not to be met by any juggling of the forms of administration, but that those difficulties lie far beneath the surface of laws or forms of their administration.

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their supposed selfish interests in transportation, and, regardless of its immediate effects upon them, standing solidly and militantly for the early adoption of government transportation policies that will give the railroads the same kind of a square deal that all business men profess to want from government for all business.

But business can no longer eat its cake and keep it. It can no longer avoid the danger of state socialism merely by listening to speeches and adopting resolutions against socialistic policies while itself constantly boring from within and weakening the entire structure of private enterprise by defending and promoting every socialistic policy by which it thinks it can temporarily gain. It cannot at this crucial crisis in railroad affairs stand stubbornly for continuance of the Old Deal in transportation without establishing an important precedent and providing a powerful argument for application of similar socialistic and destructive policies to every other kind of industry and business.

The whole system of private enterprise is under attack, and if it is to survive business must strengthen and defend it by fighting for sound, fair, constructive, non-socialistic policies for every part of it. In spite of their past inconsistencies, may we not hope, then, that business men, confronted both with the Old Deal in transportation and the New Deal in business, will become sufficiently awakened to the perils presented by these two deals to all American industry and business to stand up and fight for a square deal, fair regulations, no subsidies and an opportunity for reasonable profits and unfettered, progressive and efficient management for every kind of private business?

Bridge and Building Association Holds Meeting at Chicago

Opportunity to attend convention for first time in four years meets with enthusiastic response from members

AFTER an enforced postponement of its forty-first convention in three succeeding years, this meeting, which was to have been held in 1931, took place in a highly successful manner at the Hotel Sherman, Chicago, on October 16-18. The attendance, measured by the registration of 190 railway men, nearly equalled that of the last convention, held in 1930. The program was a full one and covered nearly every phase of the bridge and building supervisory officer's work, and the interest in the various papers and reports was sustained throughout the five sessions. An exhibit of materials and equipment pertaining to bridges, buildings and water supply also received close attention.

The major portion of the program was taken up by nine committee reports in addition to papers presented by G. Tornes, superintendent bridges and buildings, C. M. St. P. & P., Chicago, on The Programming of B. & B. Work, and by C. C. Westfall, engineer of bridges, I. C., Chicago, on The Relative Economy of Various Culvert Materials.

The convention was opened with greetings from the American Railway Engineering Association by R. H. Ford, first vice-president, and assistant chief engineer of the Chicago, Rock Island & Pacific, and from the Roadmaster's and Maintenance of Way Association by Elmer T. Howson, past president, and Western editor of the *Railway Age*.

President C. S. Heritage, bridge engineer of the Kansas City Southern, reviewed the conditions leading to the postponement of the convention for three years and described the arrangements through which the association was able to hold its meeting this year. "Curtailment of supervisory forces," he said, "has resulted in an appreciable loss of membership during the four years since the last convention; in addition, 49 members were lost by death, including four past presidents, two vice-presidents and a director." He urged the co-operation of the membership in an active campaign for new members.

Address by L. C. Fritch

Railway managements were represented on the program by L. C. Fritch, chief operating officer of the Chicago, Rock Island & Pacific, who complimented the bridge and building men on their remarkable record for the safety of structures in spite of the drastic curtailment of expenditures for bridge and building maintenance. He showed, however, that the reductions in expenses have not kept pace with the losses in revenue, which fact, together with the added burden imposed by the restoration of wage rates and the pension act, have left the roads no alternative but to apply for an advance in freight rates.

After reviewing the disastrous effects of unregulated and subsidized competition, he directed attention to the consequences of unwarranted competition within the industry. "Literally millions of dollars," he said, "are being wasted by the railroads in this form of ruinous competition among themselves. This relates not only to service, but to rates and gratuities, in order to secure temporary advantage."

Referring to the recent creation of the Association of American Railways, he said that this association is about fourteen years behind schedule. "If this had been done on March 1, 1920, with the advent of the Transportation Act, which for the first time guaranteed the railroads a square deal, and if the rights of the railroads under this act had been eagerly and earnestly pressed, the railroad situation might be different today. Nevertheless this new association has fertile ground to cultivate and it is hoped that it will enter actively and aggressively upon its duties to protect the railroads' interests, not only from internal waste, but from political propaganda and repression outside the industry."

Address by Samuel O. Dunn

In an address at a luncheon on October 17, Samuel O. Dunn, chairman of the Simmons-Boardman Publishing Company, and editor of *Railway Age*, said that he had criticized the New Deal because he believed that many of its economic policies are unsound and will tend to start a new depression. The reason that I criticized the New Deal in business is that so many of its principles so strongly resemble the Old Deal in transportation. Unfortunately, many who object to government competition in business, to regimentation, as well as to expenditures for unneeded public works under the New Deal are quite willing to have these very same policies applied to the railroad industry. They object to the Tennessee Valley project, but not to the St. Lawrence waterway project.

"This whole question of the Old Deal in transportation," he continued, "is going to be presented in a very definite way at the approaching sessions of the state legislatures and of congress. There is no question whatever but that the administration is in favor of legislation to equalize the terms of interstate competition between the railroads and other carriers. And I am very hopeful that the example that it will set will serve to stimulate the state legislatures to adopt legislation which will, in large measure, withdraw the subsidies of carriers by highway and subject them in other respects to regulation similar to that applied to the railways."

Election of Officers

In the election of officers, First Vice-President, H. I. Benjamin, vice-chairman, system committe on insurance, Southern Pacific, San Francisco, Cal., was advanced to the presidency, while the other three vice-presidents were advanced one grade as follows: First Vice-president, T. H. Strate, division engineer, C. M. St. P. & P., Chicago; second vice-president, E. C. Neville, bridge and building master, Canadian National, Toronto, Ont.; and third vice-

president, A. B. Scowden, general bridge inspector, B. & O., Cincinnati, Ohio. W. R. Roof, bridge engineer, Chicago Great Western, was elected fourth vice-president, and C. A. Lichty, general inspector, purchasing department, Chicago & North Western, was re-elected secretary-treasurer. The association voted to hold its next convention in Chicago.

Abstracts and brief reviews of the reports and papers follow:

Special Equipment for Two Long Trestles

Mr. Westfall described the long creosoted ballast deck trestles that are being built to carry the lines of the Illinois Central and the Yazoo & Mississippi Valley across the Bonnet Carre floodway between the Mississippi river and Lake Pontchartrain in Louisiana. An account of these structures was published in the *Railway Age* of July 21, page 67. However, the major portion of his paper was devoted to a description of the methods of construction, with particular reference to the equipment employed. Of particular interest are the pile drivers, of the crawler type, designed to move over the tops of the bents on skids, thus avoiding the delay that would be incurred by waiting for the caps and decks to be placed.

Mr. Westfall also discussed the other operations and the equipment employed, methods of material delivery, water supply facilities and measures designed to avoid interruptions in the progress on this important project.

Valuable Reports Presented

The reports presented at this convention, together with the names of the chairmen of the committees presenting them, were: The Maintenance of Ballast Deck Trestles; H. I. Benjamin, chairman, special engineer, S. P., San Francisco, Cal.; The Comparative Cost, Durability and Protective Value of Brush and Spray Painting, C. M. Burpee, research engineer, D. & H., Albany, N. Y.; Electric Pumping Equipment, B. R. Kulp, principal assistant engineer, C. & N. W., Chicago; The Relative Economy of Various Culvert Materials, F. M. Lehrman, designer, bridge department, C. & N. W., Chicago; The Relative Advantages of Separate as Against Combined Gangs for Bridge and Building Work, H. C. Munson, trainmaster, C. M. St. P. & P., Dubuque, Ia.; The Relative Merits of Inside Metal and Outside Wooden Guard Rails, C. A. J. Richards, master carpenter, Pennsylvania, Chicago; Lessons from the Depression, F. E. Weise, chief clerk, engineering department, C. M. St. P. & P., Chicago; High-Early-Strength Concrete—Its Place in Bridge and Building Works, L. B. Alexander, assistant bridge engineer, M. C., Detroit, Mich.; and Means of Interesting Employees in Safety Measures, F. H. Masters, assistant chief engineer, E. J. & E., Joliet, Ill. These reports are abstracted below.

The Maintenance of Ballast Deck Trestles

The report on the Maintenance of Ballast Deck Trestles consisted, in the main, of an exceptionally complete exposition of accepted methods of replacing individual piles, replacing entire bents, replacing caps and renewing stringers. These methods were illustrated by drawings and photographs, and details were given of the necessary staging, tools needed, and the precautions necessary to insure safety. The discussion of this report did not go into the detailed methods reported by the committee, but was concerned principally with the life of creosoted pile trestles and the importance of preframing material to be treated.

Relative Merits of Inside Metal and Outside Wooden Guard Rails

The report on guard rails pointed out that the outside guard rail, or guard timber, is designed to perform one function, namely, that of insuring a normal spacing of the ties and preventing bunching in the case of derailments, while the inside guard rail is intended to prevent the lateral displacement of derailed equipment. In the opinion of the committee, there is no over-lapping of functions of the two types of guard rails, and rather than discuss them from the standpoint of relative merits, the committee devoted the major portion of its report to an exposition of the more common designs of these two forms of guard rails.

The committee recommended the use of T-rails for inside guard rails, and favored the use of outside guard rails regardless of whether some other form of tie spacer is provided. The discussion of this report disclosed a general opinion favoring the use of tie spacers, or the use of bolts or lag screws in every tie, rather than the dapping of the guard timbers.

Interesting Employees in Safety

The report on safety emphasized the necessity for securing the support of the movement on the part of the management. It also stressed the need of a book of safety rules with measures designed to insure that the employees would read and understand it. Considerable space was given to the place of the foreman in safety work, the benefits derived from the activities of safety committees, special safety campaigns, and the solicitation of safety suggestions from employees. The discussion served largely to endorse the measures advocated by the committee.

Brush Versus Spray Painting

Spray painting was endorsed enthusiastically in the report on this subject. According to the report, modern spray painting machines and their accessories have been developed to such a degree that types are now available for the proper application of practically all types and weights of paints adapted to the upkeep painting of all railway buildings, bridges and structures.

The committee favored spray painting on the ground of economy in the use of paint, lower cost of application, appearance and protective value. However, the discussion of this report called attention to the excessive loss of paint with the spray application when used in high winds or when painting lacing bars or other small members.

Lessons from the Depression

The report on Lessons from the Depression consisted of a compilation of practices adopted during the last four years, that had for their purpose the attainment of economy in the use of materials and application of labor in the maintenance of bridges and buildings. The report also cited figures showing the marked reductions made in the expenditures for the maintenance of bridges and buildings as a means of demonstrating the effectiveness of measures of this kind. However, the report conceded that much of the reduction in expenditures was made possible by what amounts to the withdrawal of reserve strength built up during periods of heavy expenditures.

While most of the comments made in the discussion of this report comprised a confirmation of the committee's

contention that the depression had been responsible for greater economy in operations, one speaker declared that adequate consideration must be given to the withdrawing of strength that had been plowed into the properties during periods of prosperity. This reserve, he contended, must eventually be replaced.

What Type of Gang for B & B Work?

In the report on the relative advantages of organizing gangs to handle both bridge work and building work, or of providing separate gangs for each class of work, the committee reporting on this subject designated as advantages of the combined gang, that it cleans up all work as it progresses; it saves traveling time of the gangs; it tends to develop more capable foremen, the contention being that foremen should not be specialists; it calls for less fluctuation of seasonal labor requirements; it promotes individual responsibility and pride among the foreman and his men; and it tends to promote better morale among the men as they are able to visit their homes more frequently. Further, under this plan the men become more familiar with the characteristics and needs of their particular territories.

On the other hand, the combined gang cannot attain a high degree of efficiency because it is often necessary for the men to perform tasks with which they are not familiar. Furthermore, owing to the difficulty of making a comparison between gangs on a man-hour or other unit basis, this important incentive for increased performance is lacking with this type of gang. The same characteristic makes the programming of work difficult. Loss of time results during the reorganization of gangs for different jobs, and the hazard of personal injury is increased.

The reading of this report disclosed some positive differences of opinion, some speakers insisting on the greater economy of gangs doing all classes of carpenter work, while others were just as convinced that better results are obtained by segregating the rough bridge carpenter work from the small-tool building work.

High-Early-Strength Concrete

A report on the advantages of high-early-strength concrete and the methods by which it may be produced was presented by a committee of which L. B. Alexander, assistant bridge engineer, Michigan Central, was chairman. It is abstracted in brief below:

High-early-strength concrete is a concrete that will attain strengths capable of carrying specified loads or of resisting abrasion in a shorter period of time than is possible with ordinary methods or materials. It is usual to expect working strengths in from 24 to 72 hours.

High-early-strength concrete may be obtained in three different ways:

1. By special manipulation with standard brands of portland cement.
2. By the use of admixtures with standard brands of portland cement.
3. By the use of special high-early-strength cements.

Standard Portland Cement Concrete

In general, those factors which increase the strength of standard portland cement concrete in 28 days, increase the strength at early ages relatively more. Any measure that will double the 28-day strength will much more than double the 3-day strength. Tests show that a concrete designed to develop 3,000 lb. per sq. in. at 28 days, will under ordinary conditions attain a strength of 900 lb. in 3 days, while a concrete designed for 6,000 lb. at 28 days would attain a strength of 3,000 lb. in 3 days.

The effect of changing the quantity of mixing water is well known. A decrease of about one per cent of water results in an increase in strength of about five per cent at one or two days. Furthermore, the dense paste resulting is certain to contribute to the durability of the concrete when exposed to severe conditions.

In addition to the selection and rigid maintenance of a low water-cement ratio, an increase in the mixing time increases the ultimate strength as well as its strength at early ages. High early strengths can be expected only when the temperature conditions for placing and curing are favorable. For high early strength it is important that the temperature of the mix when placed should be between 70 and 100 deg. F., and that these temperatures be maintained for as long a period of time as possible after placing.

Admixtures that act mechanically to increase the plasticity of a mix, contribute little to the strength of concrete, and have no place in this report. However, admixtures that act chemically as accelerators can often be used within certain limits to obtain high early strength. Of these, the most common is calcium chloride. Calcium chloride does not react with all brands of cement in the same way, so it is well to make perliminary tests. Generally, from two to four per cent, by weight, of the cement, dissolved in the mixing water may be used. Larger amounts have a tendency to produce a flash-set which would be injurious.

Any accelerator which is corrosive to steel should be used with discretion in highly reinforced concrete, as cases are known where corrosion of the reinforcing has caused extensive failure of the concrete. The committee has no evidence that calcium chloride as an admix produces corrosion. Accelerators should not be used in reinforced concrete structures that will be exposed to stray electrical currents.

Special high-early-strength cements can be employed to produce concrete of a high early strength with a mix of customary proportions, consistency, ease of handling and workability. It is possible to produce 4,000-lb. concrete in 24 hr. Even this strength may be exceeded by the addition of an accelerator to a mix involving the use of high-early-strength cement—in some cases strengths in excess of 6,000-lb. have been obtained in 24 hours. There are a number of high-early-strength cements on the market which are giving satisfactory results when used in accordance with the requirements of the water ratio, placement, temperature and curing as discussed under, "Standard Brands of Portland Cement."

Discussion

The discussion turned largely to the differences in physical and chemical characteristics of standard and high-early-strength cements. It was brought out that while the processes of making the two cements differ somewhat, the materials are the same. The chemical composition is almost identical for the two, while the major difference in physical characteristics of the finished product is in the greater fineness of the high-early-strength cement. Mention was made of a product recently put on the market which has developed strengths as high as 2,000 lb. in 2 hr., 4,000 lb. in 4 hr. and 10,381 lb. in 28 days.

Programming Bridge and Building Maintenance

By G. Tornes*

During the last few years we have been programming bridge and building maintenance work and scheduling the performance of the field crews, and careful records show that this activity has brought us some very beneficial results. It is obvious that the supervisor of field activities can handle his forces more efficiently if he has an accurate program and schedule of work. It is of great advantage to a management to know with reasonable accuracy on January 1, the amount of money that will be required for bridge and building work during the coming year. Again, by being able to lay down before the purchases and stores departments a complete statement of materials required throughout the year, giving dates on which deliveries must be made, these departments are in position to make advantageous purchases and an orderly distribution of material.

The first and most important step in the preparation of both program and schedule is a thorough inspection of all structures by inspectors who are qualified to determine what repairs will be needed properly to maintain these structures from one work-

* Superintendent of Bridges and Buildings, Chicago, Milwaukee, St. Paul & Pacific.

ing season to the next. As soon as the program has been decided upon, a schedule is prepared for carrying it out. This consists of classifying the work to be done, estimating the man hours required at each structure, assigning the work to crews properly organized for the particular classes of work, and estimating the dates on which the work on individual structures will be started and completed.

All bridge and building forces work under the jurisdiction of the division supervisors while on the respective divisions, but the division officers are not permitted to change the schedules, except in an emergency which requires immediate use of the forces for the continuance of traffic, or on the authority of the general office. We have found that the longer the system is in effect the fewer are the requests from division officers for permission to depart from the schedule.

After the programs and schedules are prepared for every division on the system, requisitions are forwarded to the purchases and store departments for all materials required during the season. Delivery dates are shown on these orders. Information as to the order in which material is to be unloaded is also furnished. This is to avoid the difficulty experienced, for example, when it is found that the first timber wanted is at the bottom of the carload.

From the completed schedules we also prepare a report of the money to be spent during the year and the retirements to be made, divided into the various accounts and by months. This report is of value to the general officers, enabling them to anticipate the need for the money required to carry on the bridge and building work.

For the purpose of following up the location of the various crews and their progress, and for cost keeping, a monthly progress report is made by each division. To simplify the work involved in making the estimates, man-hour factors for various units of material are applied. The progress report shows the actual man-hour factors developed by each gang on each job as the crews perform their work. The application of these factors provides a convenient means for checking the efficiency of each crew. It has been found that the average good crew can meet the scheduled dates by doing an honest day's work and without unpleasant driving on the part of supervisors.

Our records show that the application of this plan has resulted in an increased output of work per dollar spent in labor, sufficient to effect a payroll reduction of slightly more than one million dollars annually. It is our conviction that our company will continue to save this million dollars yearly so long as the bridge and building work is programmed and scheduled, provided these programs continue to be prepared accurately and a sincere effort is made to carry them out.

Relative Economy of Culvert Materials

The report of the Committee on Relative Economy of Various Culvert Materials, which was presented by the chairman, F. M. Lehrman, structural designer, Chicago & North Western, comprised a comparison of the advantages and disadvantages of creosoted wood, concrete and corrugated sheets and plates, as employed in culvert pipes. This comparison was discussed from the standpoint of hydraulic efficiency, service life, ease of handling, and methods employed in application.

The matter of relative resistance to flow was disposed of briefly by directing attention to tests made at the University of Iowa, that indicate somewhat greater frictional resistance in corrugated metal pipes than in those presenting a smooth interior surface. In discussing service life, the committee cited the investigation of the Highway Research Board, Washington, D. C., which, although it has embraced the inspection of a large number of culverts, has not thus far been fruitful of any conclusive data. Other parts of the report are abstracted briefly below:

Treated Timber Culverts—While the gradual depletion of the nation's timber resources has made it necessary or economical to use other materials instead of wood in all but the western parts of the country, some railroads continue the use of treated timber in the construction of box culverts; some wood-stave pipe has also been used. On one western road a large group of box culverts of creosoted pine have been in service for 30 years or more, and no culvert in this group has been removed on account of decay. The timber of which these culverts were built was treated by the full-cell process with an average net retention of approximately 10 lb. of creosote per cu. ft. of timber.

Reinforced Concrete Pipe—A concrete pipe is a rigid structure and ultimate failure generally occurs through collapse. Pipe of this type is widely used in sizes up to 84 in. for culverts and cattle passes, and is not infrequently jacked through old fills. The signs of approaching failure in concrete pipe are those common to all reinforced concrete structures and are generally known and readily recognizable. The various local defects, such as faulting, unequal settlement and separation at joints do not necessarily indicate imminent failure, although they may reduce the capacity of the culvert to carry off flood waters. Generally speaking, the rapidity and extent of deterioration seem to vary in inverse proportion to the quality of the concrete. Improved methods of manufacture, particularly the introduction of vibratory casting and adequate curing of the concrete before the pipe is placed in the ground, produce a concrete which is more dense and which should be more durable than that which was common 10 years ago.

Corrugated Metal Pipes—Widespread use has been made of corrugated metal pipes in recent years. They have been placed in permanent as well as temporary construction, and under both high and low fills composed of all the materials generally encountered in railway construction.

Flexible pipe culverts generally fail through the deterioration of the metal. Some of the conditions which are particularly destructive are: Continuous exposure to stagnant water, especially where heavy vegetation produces organic acids; the runoff of mine water or barnyard drainage; the brackish waters of tidal areas; and the alkali soils of the arid and semi-arid sections of the country. Culverts installed under these conditions should be of extra-heavy gages of base metal.

Corrugated metal culverts should be laid on such grades that excessive velocity of flow, with its attendant abrasion, will be avoided. If this is not possible, paving of the invert will afford some protection so long as it remains in place.

Discussion

The discussion disclosed an increasing interest in corrugated metal pipe, a number of speakers reporting excellent service, based on observations over periods up to 15 years. One speaker reported that no failures had occurred in concrete pipe in a service experience of 24 years. Comments on creosoted wood boxes confirmed the findings of the committee. The strutting of both concrete and corrugated metal pipe was advocated where they are to be covered with new fills.

Electric Operated Pumping Equipment

A review of the advantages and disadvantages of electricity as a source of power for the operation of pumps, and an account of some of the practical considerations involved in the use of electric motors for pumping water were presented in a report which is abstracted below. This report was presented by the chairman, B. R. Culp, principal assistant engineer, C. & N. W.

In the opinion of the committee electrical pumping equipment possesses the following advantages: Electric motors are smaller than other type of power units of the same capacity, and therefore require smaller space for installation and lighter foundations; they can be housed in a smaller building, are simple in operation and are adapted to automatic control. They have long life and the initial cost is low. The controlling advantages effected through the use of electric driven pumps in most installations are the reduction in cost of attendance and, to a lesser extent, the lower initial cost of the plant and lower cost of maintenance. The cost for electric current in many cases will exceed the cost of steam so far as power is concerned, and will greatly exceed the power cost of oil-engine operation. Therefore, unless a particularly attractive rate may be obtained or other conditions make it advisable to use electricity, electric power will prove desirable and economical only where reductions may be effected in attendance costs.

As to the disadvantages: Electric motors can be used only

where electric power is available in the vicinity of the plant. There is also the risk of interruption in power service on account of storms and other conditions that interfere with the transmission lines. The cost of power may be prohibitive. They must be located above high-water elevation to insure against damage during floods. There are also extreme cases where it is necessary to construct long transmission lines, the cost of which may greatly exceed the cost of the pumping equipment.

Modern power installations are confined almost altogether to the use of semi-Diesel oil engines or electric motors. While engines of the semi-Diesel type produce power at a much lower cost for power alone than electricity, the first cost of the unit, the additional housing required, and the attendance and maintenance charges, are invariably greater with the oil engine than with the electric unit.

Well Installations

Electric power is adapted particularly to pumping from wells. The deep-well turbine or vertical centrifugal pump will deliver more water from a well of a given size and capacity than any other method of pumping, with the possible exception of the air lift. Owing to the limitations of construction and the transmission losses of the long line shafts, these pumps do not have an average efficiency of more than 50 per cent.

Deep-well turbines are available in capacities of from 100 to 5,000 gal. of water per minute and for use at depths of from 20 to 500 ft. Where the pumping lift of the water is more than 500 ft., the air lift is more desirable than the shaft-driven turbine pump because of the difficulty of maintaining the long shafts.

In point of the cost of the power used, the four types of pumping equipment fall in the following order, with the least expensive at the head of the list: Gasoline or oil engine-driven pumps, steam-driven pumps, electric-driven pumps, and air lifts. It should be borne in mind that this applies to power costs only. If attendance charges can be eliminated by using automatic or remote control, electricity usually becomes the most economical power, oil, steam and air being next, in the order named.

Automatic Control

Practically all types of electrical pumping equipment are adapted to automatic control, of which there are several types. One of these is the float switch which will operate satisfactorily where there is no danger of freezing. Another is the pressure type which will give satisfactory results as long as no obstruction is present in the pump, or as long as the velocity pressure can be maintained on the facilities. However, one of the most common automatic controls now in use is the mercury switch control, which, if properly installed, operates at practically no cost and with a minimum of maintenance under all climatic conditions. Some railroads use a combination pressure and mercury-tube control, tapped into the discharge line from the pump.

An important factor in the cost of electricity for the operation of pumps is the standby cost, which is an arbitrary charge regardless of how much current is consumed. In the case of small pumping stations, where but little power is required, this standby charge often makes the installation of electric pumping units prohibitive. In the larger stations where the power consumption is reasonably high the standby charge is not of such great importance, as it is readily absorbed in the power cost.

While it is desirable to have motors of ample size to prevent overloading, the standby charge, as well as the lower efficiency, makes it desirable to avoid installing motors greatly in excess of the power requirements, except where attractive rates for off-peak loads may make it desirable to confine the pumping to the hours when the lower rates may be obtained.

Discussion

A question arose as to the division of responsibility between departments where electric pumping equipment is installed, since the water service organization rarely includes workmen skilled in electrical maintenance. One example was given of a road on which this difficulty has been overcome by depending on signal maintainers to handle the electrical work in connection with these installations. It was also stated that ball-bearing motors will reduce maintenance of this equipment to a minimum, and that lubrication troubles are thereby practically eliminated. The committee did not recommend any particular type of automatic or manual control but said that each case should be decided in the light of local conditions.

U. P. Train Set Records

NEW world speed records were established by the six-car high-speed train of the Union Pacific when it traveled from Los Angeles, Cal., to New York, 3,258 miles, in 56 hours 55 minutes from October 22 to October 25. This world record for long-distance high-speed railroad passenger travel was a test of the 39-hour schedule on which the six-car and two nine-car trains will run when they are placed in regular service between Chicago and Los Angeles, and which will be the fastest long-distance established passenger train schedule. The train left Los Angeles at 10 p.m. on October 22 and arrived in New York at 9:55 a.m. on October 25, completing the 3,258 miles in 56 hours 55 minutes or at an average of 57.2 miles per hour. It arrived in Chicago at 2:50 p.m. on October 24, completing the 2,298 miles in 38 hours 47 minutes, or at an average speed of 59.2 miles per hour. The maximum speed attained by the train was 2 miles in one minute. The 508 miles between Cheyenne, Wyo., and Omaha, Neb., was traveled at an average of 84 miles per hour.

U. P. and Builders' Representatives Aboard

Among the 58 passengers on the train were W. A. Harriman, chairman of the board of the Union Pacific; Carl R. Gray, president; F. W. Charske, chairman of the executive committee; William M. Jeffers, executive vice-president; D. A. Crawford, president of the Pullman Car & Manufacturing Company; C. F. Kettering, vice-president of General Motors; and H. K. L. Hamilton, president of the Winton Engine Corporation.

Between Los Angeles and Chicago only three stops were made, these being for the purpose of refueling and broadcasting the progress of the train. These broadcasts were made at Salt Lake City and Cheyenne by Norman Barry and Sidney Strotz of the National Broadcasting Company, who traveled with the train. Another broadcast was made at Omaha. At Chicago the train was refueled and another broadcast made between 2:50 p.m., the time of arrival, and 3:30 p.m., the time of departure.

The Schedule

The schedule of the train, which was about 20 hours less than that of the Los Angeles Limited, between Los Angeles and Chicago, was as follows: Left Los Angeles at 10:00 p.m., October 22; arrived San Bernardino at 11:08 p.m.; arrived Salt Lake City at 1:40 p.m., October 23; left Salt Lake City at 2:00 p.m.; arrived Cheyenne at 10:46 p.m., October 23; left Cheyenne at 10:56 p.m.; arrived Omaha 6:07 a.m., October 24; left Omaha at 6:45 a.m.; arrived Chicago at 2:50 p.m., October 24; left Chicago at 3:30 p.m.; arrived New York at 9:55 a.m., October 25.

That portion of the trip between Los Angeles and Salt Lake City, 784 miles, was covered in 14 hrs., 37 min., or at the rate of 53.6 miles per hour; the 519 miles between Salt Lake City and Cheyenne in 8 hrs., 46 min., or at 59.2 miles per hour; the 508 miles between Cheyenne and Omaha in 6 hrs., or at the rate of 84 miles per hour; the 488 miles between Omaha and Chicago in 8 hrs., 5 min., or at 60.4 miles per hour; and the 966 miles between Chicago and New York in 17 hrs., 25 min., or at 54.3 miles per hour.

The route of the train was over the Union Pacific from Los Angeles to Omaha, the Chicago & North Western from Omaha to Chicago, and the New York Central from Chicago to New York.

Box Car Pool Proposed in Report to Co-ordinator Eastman

Report of Section of Car Pooling submitted to regional co-ordinating committee

WASHINGTON, D. C.

THE immediate formation of an organization, to be controlled by the Association of American Railroads, for the operation of all box cars, except ventilated and automobile box cars, in interchange between railroads in the United States, in a nation-wide pool, as the initial step toward the development of a more comprehensive plan, is proposed in a report prepared by Co-ordinator Eastman's Section of Car Pooling and submitted by the co-ordinator under date of October 23 to the Regional Co-ordinating Committees representing the railroads.

The report, prepared under the direction of O. C. Castle, director of the section, and N. D. Ballantine, assistant director, states that the ultimate objective is to acquire ownership of cars assigned to the pool, together with necessary facilities for repairing cars, and to assume full responsibility for providing and maintaining a car supply adequate for the needs of shippers on all participating railroads, but for the initial step a lease or contract basis is proposed, without change in ownership for the present, and the pool would compensate car owners on the basis of the appraised value of the equipment. The plan also contemplates the co-ordination of the retirement and replacement of freight car equipment in such a manner as to insure an adequate supply and an orderly and stabilized program of car construction. The report includes estimates of possible savings of $75,000,000 a year by prevention of unnecessary empty-car mileage and of $25,000,000 a year in capital carrying charges through co-ordination of operation and purchases.

In commending the report to the "very careful consideration" of the regional committees, Mr. Eastman said "the matter is of first rate importance and merits direct handling by the railroad executives."

The report includes a complete plan of organization and rules of operation for the proposed freight car pool, accompanied by a footnote saying the plan as presented is designed to meet conditions of voluntary action by the railroads, and that some changes in form and detail would be necessary "if the plan is to be made effective by a formal order or legislative enactment."

Eastman Urges Careful Consideration of Plan

"The plan proposed," Mr. Eastman said, "is designed for voluntary and immediate adoption by the railroads of the country upon a practicable basis capable of gradual expansion and improvement until the ultimate development is at length reached. In the preparation of the plan, the Section of Car Pooling has had the cooperation and valued assistance of committees of transportation, mechanical, and accounting railroad officers in active service. They have given this aid freely and generously, but it must not be understood that they are in any way committed to the plan. The Section of Car Pooling assumes full responsibility.

"The report is so arranged that it can be readily understood and considered. It begins with a synopsis of the facts presented and of the recommendations. It closes with specific answers to the objections which have so frequently been made to a car pool. I do not need to attempt any summarization of its contents. Permit me to suggest, however, that at some stage in the consideration of the report you confer with Messrs. Castle and Ballantine and give them an opportunity to talk directly with you and answer any questions which may occur to you. The matter is of first rate importance and merits direct handling by the railroad executives.

"One point which is brought out in the report I wish to emphasize. Every time that two or more railroad systems are combined cars are pooled that formerly were owned by separate companies. Some of the car pools which have thus been formed are very large. Consider, for example, the Southern Pacific system, which extends the entire length of the Pacific Coast and eastward as far as New Orleans. The car requirements on the various parts of this system differ widely, yet problems of supply and distribution are handled more effectively than if the cars were divided in ownership and handling among many separate companies. Nor does any one doubt, I believe, that car supply and distribution could be handled effectively if all the railroad companies of the country were combined into a single system.

"Under the proposed plan precisely the same principles of supply and distribution are applied. The difference is that instead of accomplishing the result by combining or pooling the companies, it is accomplished by pooling only the cars in the hands of a federated organization representing all of the companies. There are differences in accounting and similar matters, but not in the principles of car supply and distribution. From this point of view, the plan is not on experiment but rests on the sound foundation of practical experience.

"I commend this report to your very careful consideration, and have no doubt that it will receive such consideration."

Mr. Castle, in a memorandum accompanying the report expressed the conclusion:

(1) That there is a substantial and increasing volume of empty-car mileage in excess of that which is necessary in the equalization of unbalanced traffic and the orderly and efficient relocation of freight cars.

(2) That the methods heretofore applied in the regulation of freight car interchange are ineffectual in the avoidance of these unnecessary and wasteful movements.

(3) That the defects in the methods are fundamental and cannot be corrected without basic changes in the regulations.

(4) That the co-ordinated operation of interchange freight cars offers the best practical solution for the correction of existing defects.

(5) That the pooling of freight cars would immediately effect one of the principal benefits claimed by those

who urge railroad consolidations without waiting for the final determination of the major features of such consolidation.

"We present, therefore," he said "as the essential feature of our report, a definite proposal for a freight car pool, to include initially all box cars (excepting ventilated and automobile box), which are now or may subsequently be operated in interchange between railroads in the United States. We recommend the adoption of this proposal by the railroads at the earliest practicable date."

The report also included the following synopsis of facts and recommendations:

Synopsis of Report

Facts

(1) In the through or "interline" movement of freight by rail, cars of necessity pass beyond the rails of their owners and are freely interchanged between railroads.

(2) Regulations which govern the interchange of freight cars are the development of more than seventy years. Throughout this period the basic principle of the regulations has been the right of the car owner to the control of his individual car. These rules are commonly known as "ownership rules."

(3) The rules relating to the settlement between railroads for the use and maintenance of cars, although imperfect and inequitable, are definite and enforceable; those relating to the use and return of cars are indefinite and without adequate means for their enforcement.

(4) So-called "originating" railroads, although required to maintain a car ownership sufficient to meet their obligation to the public, have no control over their equipment when moved beyond their rails.

In periods of heavy demand, railroads so situated are frequently denied the use of their cars, with consequent loss of revenue for which the car rental is inadequate compensation.

(5) So-called "terminating" railroads, which in times of shortage freely use the cars of other railroads in disregard of the principles of the regulations, can avoid burdensome car hire charges when cars are plentiful only by returning "foreign" cars empty and using their own cars for loading to points beyond their rails. The effect is a crosshaul movement of empty cars of the same class and condition.

(6) The volume of empty-car mileage has increased annually, and analyses of car movements demonstrate that in the case of railroad-owned cars the increase is in a large degree caused by the efforts of individual railroads to shift the per diem burden.

(7) The operation of privately-owned freight cars presents problems which have disturbed the railroads and engaged the attention of regulatory bodies over a long period.

In recent years practices have been developed in the operation of these cars, particularly privately-owned refrigerator cars, which adversely affect railroad revenues, not only by the creation of excessive empty-car mileage and the displacement of railroad-owned cars by cars owned or leased by shippers, but through money payments and other concessions which are in effect rebates to shipper-owners.

(8) The annual "excess" empty-car mileage now exceeds 2,000,000,000 miles. A conservative estimate of the operating savings possibly by the prevention of this unnecessary movement is $75,000,000 per year.

(9) The lack of coordination in car interchange has the further effect of increasing the number of cars necessary to carry the traffic of the country. Car purchases controlled by individual needs ignoring general conditions, create instability in the volume of car construction with consequently higher unit prices.

(10) The estimated saving in capital carrying charges possible through the coordination of operation and purchases is $25,000,000 per year.

(11) The situation demands serious consideration of constructive suggestions for changes in methods whereby uneconomical practices may be corrected and substantial savings effected.

(12) Experimentation with numerous per diem and penalty rules, and with variations of the so-called "ownership" rules, has failed to correct the defects in the regulatory methods, which defects have been demonstrated to be fundamental.

(13) A recent study of the conditions outlined herein by authoritative railroad organizations, covering a period of several months, has resulted in no practicable suggestions by railroad organizations for fundamental changes in methods.

Recommendations

(1) All freight cars suitable for interchange service owned by steam railroads and private car lines operating in the United States should be assigned to a general pool operated by a central agency under the control of participating railroads for the joint and proportionate benefit of car owners and users.

In the initial operation of the pool, ordinary box cars only should be included, other classes and types of railroad-owned and private line cars to be added as experience in the operation of the pool may warrant its expansion.

(2) The ultimate objective of the pool is to acquire ownership of cars assigned to the pool, together with necessary facilities for repairing cars, and to assume full responsibility for providing and maintaining a car supply adequate for the needs of shippers on all participating railroads.

The immediate objective is the acquisition by lease or contract of all cars of the type designed for pool operation and the formation of an organization for the operation of cars in a nation-wide pool. No change in ownership is at present involved, and car initials will remain unchanged except for the addition of a pool designation.

(3) The pool organization should be controlled by the Association of American Railroads.

(4) The pool will compensate car owners for the ownership costs of cars used in pool service, based upon the appraised value of equipment; will maintain cars in suitable condition to meet transportation requirements; will make equitable distribution of cars as between railroads, on the basis of proportionate unit contribution to the pool, and will coordinate the retirement and replacement of freight car equipment in such manner as to insure an adequate supply and an orderly and stabilized program of car construction.

(5) The pool will collect from car users a daily rental sufficient to meet the fixed cost of ownership and will prorate the cost of repairs and the operating expense of the pool among participating railroads upon the basis of car mileage.

(6) The pool will operate through a central and district offices in charge of a General Manager and District Managers. District Managers will regulate interchange and distribution in the most economical manner as between railroads in their respective districts. The Central office will regulate distribution as between districts. Distribution between divisions of participating railroads and to shippers will be handled as at present by the individual railroad organizations.

The proposed plan of organization is as follows:

Plan of Organization and Rules of Operation*

Section I (a). Organization: The control of the pool shall vest in the Association of American Railroads, which shall arrange for the creation of a corporation with all the power necessary for the purposes of the pool.

The Directors of the Association shall be ex-officio Directors of the Corporation.

(b) The administration of the pool shall be under the direction of a Board of Control consisting of two members from each District herein provided for, and one representative designated by the Federal Coordinator of Transportation so long as his position shall continue and thereafter by the Interstate Commerce Commission.

(c) The District representatives shall be selected by participating railroads in each distribution district, one member from each District being a Transportation Department officer and one a Mechanical Department officer.

(d) The term of office of railroad members shall be three years, except that in the initial organization of the Board, one member from each District shall be selected for a term of two years only, at the expiration of which their successors shall be selected for the full term of three years.

(e) The Board shall elect a Chairman from among its own members.

(f) The regular meetings of the Board shall be held quarterly in Washington, D. C., on the first Thursday of March, June, September and December of each year.

(g) Special meetings at other times and places shall be held at the call of the Chairman, or upon written request of three or more members of the Board.

Section II (a). The Board of Control shall appoint a General Manager who shall be responsible for the operation of the pool. Other general officers reporting to the General Manager shall be a Mechanical Superintendent, an Auditor, a Secretary-Treasurer, and a District Manager for each designated district.

(b) The General Manager shall select the personnel and fix the salaries of all officers and employees, subject to the approval of the Board of Control.

(c) Employees of the Pool organization shall be considered

* This plan as presented is designed to meet conditions of voluntary action by the railroads. Some changes in form and detail will be necessary if the plan is to be made effective by a formal order or legislative enactment.

as railroad employees, with the privilege of free transportation accorded to such employees.

Employees transferred from the service of railroads shall retain insurance, retirement, and other rights to which their previous railroad service entitles them.

(d) The Board of Directors shall arrange for periodical and independent auditing of the accounts of the pool, and for such bonding of officers as may be, in their judgment, necessary.

Section III (a). Allocation of Railroads to Districts: All steam railroads in the United States shall be allocated to Districts, the allocation to be made upon the basis of the normal interchange of loaded freight cars of the type or types included in the pool. (See Appendix for tentative assignments.)

(b) Short lines and railroads which are not parties to the Per Diem Rules Agreement shall be assigned to specific trunk lines for purposes of car distribution and accounting.

(c) Distributive Districts shall be established as follows, with headquarters at the designated cities:

Number	*Name*	*Headquarters*
1	New England	Boston, Mass.
2	Eastern	Cleveland, Ohio
3	Southeastern	Atlanta, Georgia
4	Western	Chicago, Illinois
5	Southwestern	St. Louis, Missouri

Section IV (a). Equipment Assignment to the Pool: Each railroad will assign to the car pool under contract or lease, all its presently owned and subsequently built freight cars of type and class which it is determined are to be pooled, and which conform to physical requirements as established by the Pool Management.

(b) *Pool Car Identification Marks:* Each freight car assigned to the pool shall have an identifying letter "D" added to the car number to be used in all transportation and car accounting references. No other change in car initials or numbers will be made except as may be subsequently provided through change in the rules.

Section V (a). Appraisal of Cars Assigned to the Pool: Each railroad contributing cars to the pool will furnish the General Manager of the pool a certified statement of the individual car numbers, with such detailed information relating to each car as may be required for use in its proper appraisal.

(b) Cars assigned to the pool shall be appraised on the basis established in Rule 112 of the American Railway Association (M. C. B.) Code of Rules governing the interchange of freight cars as now in effect with the following modifications: the value of each car or series of cars shall be the reproduction cost as outlined in the rules, less straight line depreciation at 3 per cent per annum from date car was built or rebuilt, limited to a maximum depreciation of 45 per cent of the reproduction cost when entered into the pool. The reproduction cost established for rebuilt cars shall reflect the second-hand parts used therein. Equipment purchased second-hand shall be reproduced as second-hand.

(c) In the event that, because of circumstances peculiar in the cases of individual railroads, the application of the basis prescribed produces results which are unreasonable, the appraisal shall be made a matter of adjustment by conferences of the interested railroad, the pool management and a representative of the Bureau of Valuation of the Interstate Commerce Commission.

Section VI (a). Distribution of Pool Cars: Each railroad system will be responsible as at present for the proper distribution of car supply on its line.

(b) District Managers will be responsible for the equitable distribution of pool cars as between the railroads in their respective Districts; the General Manager will be responsible for the general distribution as between Districts.

Section VII. Maintenance of Pool Cars: The maintenance of pool cars will be the obligation of the pool management. Heavy, or Classified, repairs will be arranged for preferably with the car owner. Running repairs will be made by the holding road at its most convenient and economical repair point.

Section VIII (a). Accounting for Car Repairs: Interstate Commerce Commission Account No. 314, Freight Train Car Repairs, shall be subdivided so as to separate the items now included therein as between "Transportation" and "Freight Car Repairs," the latter item to be further separated as between "Pool Cars" and "All other Cars." The "Pool Car Repairs" portion so reported to the Interstate Commerce Commission will be accepted by the Pool Manager as a proper charge to the pool for pool car repairs, subject to a check of the railroad accounts by the Pool Management. No specific car repair bills will be made by one road against another.

(b) The cost of repairing damages to, or for the destruction of, cars caused by accidents, wrecks, fires or unfair usage as defined in M. C. B. rules, shall be borne by the responsible road through proper adjustment of Interstate Commerce Commission Account No. 314.

(c) The loading of green hides, oils, cresoted products or other commodities into closed cars suitable for high-grade commodities, thereby rendering them unfit for such use, shall be considered unfair usage and the expense incident to restoring the cars to commodity Class A condition shall be borne by the road responsible for the damage.

(d) The cost of specially conditioning and carding cars for specific commodity loadings, furnishing and applying grain doors, car liners, sweeping, cleaning, scrubbing, etc., is an obligation of the originating road management. It shall be the duty of the pool management to determine upon and require uniform practices with respect to inspecting, carding and reporting the condition of pool equipment offered in interchange.

(e) In the anticipation of a heavy general demand for a particular type of car, it shall be the obligation of the pool management to authorize a maintenance program which will insure a supply of serviceable cars of the required type equal to 95 per cent or more of the total number of such cars in the pool.

Section IX (a). Compensation to Car Owner: The car owner shall be credited currently with an amount sufficient to cover the fixed cost of ownership as determined upon the total appraisal of equipment assigned to the pool.

(b) The items which will be represented in arriving at the fixed cost will be Interest, Depreciation, Taxes and Insurance.

(c) Interest: Interest at 6 per cent per annum shall be computed quarterly upon the appraised and depreciated values of the total assigned cars.

(d) The amount of interest so determined shall be included in the amount to be credited to participating roads in accordance with rules hereinafter set forth. This amount shall also be an item in establishing the per diem rate to be charged for the use of pool cars by pool members.

(e) Depreciation: Depreciation at a rate established by the joint committee provided for in Section V shall be computed upon the reproduction cost. The rate of depreciation shall be changed as may be necessary to conform to rates which may later be established by the Interstate Commerce Commission.

The amount so arrived at shall be included in the amount to be credited to participating roads in accordance with rules hereinafter set forth. This amount shall also be an item in establishing the per diem rate to be charged for the use of pool cars by pool members.

(f) Taxes and Insurance: The expense of taxes and insurance on pool cars is an obligation of the pool. Such expense shall be included in the amount to be credited to participating roads. This expense will also be included in the amount used to establish the per diem rate to be charged for the use of pool cars by pool members.

Section X. Pool Cars Destroyed: When, for any reason, a pool car is destroyed, the Pool Manager shall be promptly furnished with full information in order that accounts may be correctly stated and settlement effected with owner. Such settlement shall be on the basis of American Railway Association Code of Interchange Rules.

Section XI (a). Pool Cars Retired and Replaced: The pool management may require the retirement or withdrawal of cars which become obsolete, or which are unfit for pool service due to deterioration or weak construction.

(b) Subject to the approval of the pool management, car owners may maintain their unit contribution to the pool by providing for replacement or destroyed or retired equipment with new units of a design conforming to pool standards.

Section XII (a). Additional Equipment: Should pool members not elect to replace retired cars, or if additional equipment shall be required for pool service, the pool management may arrange for the purchase or construction of new cars of suitable design.

(b) Such cars when acquired shall be owned by and operated for the benefit of the pool.

(c) No pool member shall be permitted to purchase or build for interchange service cars of the type or types included in the pool without formal approval of the pool management.

Section XIII. Determination of Per Diem Rate: The Pool Manager will ascertain quarterly as of the first of January, April, July and October of each year, the average ownership expense per car assigned to the pool. The basis of expense will include interest, depreciation, insurance, taxes, and an amount sufficient to cover the administrative and other expenses incident to the operation of the pool. This per-car-day charge will be assessed monthly against all pool members for all pool car-days accrued on their lines.

Section XIV (a). Computing Per Diem Charges: The location by roads of all cars assigned to the pool must be ascertained as of 12:001 A. M. of the first day of pool operation.

(b) Trunk lines will include in their inventory cars located on short line or non-participating railroads for which the trunk line

is made responsible in the allocation of roads. Each participating road will report to the Pool Manager the total number of pool cars in its possession as ascertained by the inventory.

(c) The reports of location will be checked and adjusted to determine a correct balance upon which to base per diem debits and credits.

(d) A daily record of interchange balances by junction points will be maintained and the balances by roads will be summarized. Increases and decreases in the number of cars on line as indicated by the summarized balances will be carried forward daily.

(e) From this record each participating road will determine the total number of pool car-days on line for each calendar month. This information will be certified to the Interstate Commerce Commission with a copy to the Pool Manager who will accept it as correct, subject to check as desired.

(f) The number of days so reported will form the basis of the per diem charge against the participating road subject to credits and charges as provided elsewhere in these rules.

(g) There will be no report or settlements for per diem days on individual cars or between participating roads.

Section XV (a). Mileage Charges: Each participating railroad, in making its monthly reports to the Interstate Commerce Commission, shall be required to sub-divide its car mileage data showing separately the loaded and empty mileage made by pool cars. It will also be required to sub-divide Interstate Commerce Commission Account No. 314, separating the amounts spent in repairs to pool cars from the expenditures for all other cars. Accompanying the report of repair charges there shall also be a statement showing the amounts which are deductible therefrom on account of repairs made to cars damaged or destroyed in wrecks, fires, unfair usage, etc., as provided for elsewhere in the rules, and which are a direct charge against the holding road. Copies of these reports will be furnished to the Pool Manager who will accept them as a bill against the pool for car repairs, subject to check as desired.

(b) The aggregate of the net amounts so reported, plus all other expenses incurred for the maintenance of pool cars, shall be apportioned and charged to the railroad participants in the pool on the basis of the relation which the mileage of pool cars on each railroad bears to the aggregate pool car mileage.

Section XVI. Members' Right to Equivalent Units Assigned: It shall be the obligation of the Pool Management to supply to any participating road on demand pool cars equivalent to the proportionate unit contribution of such road to the pool, and to authorize maintenance of pool cars in condition to meet the demands on the respective roads.

Section XVII. Members' Obligation of a Voluntary Gateway Equilization: Each pool participant will be required to maintain a voluntary gateway interchange equalization consistent with traffic movements over a reasonable period of time, not to exceed thirty days. Deficiencies in interchange of any month will be carried over to the following month. Interchange of empty equipment to connections to maintain stated equalization will consist of cars of owners as follows, preferably in the order listed:

(a) Cars of the receiving road;

(b) Cars of roads in the same district pool group as the roads to which empty cars are delivered;

(c) Cars of roads in other district pool groups with which the receiving road has direct physical interchange;

(d) Cars owned by delivering road.

Section XVIII. Members' Obligation in Preferential Use of Pool Cars: It will be the obligation of participating roads in filling orders for cars to move beyond their own lines, to apply pool cars of marks other than the loading road when readily available, preferentially in the following order:

(a) To points on or via the owning road;

(b) To destinations on or via any road in the same District pool group as the car owner;

(c) In the direction of any road in the same District Pool group as the car owner.

Section XIX. Report and Disposition of Surplus Cars: Each railroad system will report as required, through its District office, surplus pool cars for which it has no demand. Disposition of surplus pool cars not required by the holding road will be arranged by the District Managers through railroad representatives designated by each railroad system.

Section XX (a). Storage of Surplus Pool Cars: When, by reason of a lack of demand for equipment, the District Pool Manager determines that it is necessary to store pool cars, he shall arrange for such storage, primarily in originating territories. Cars will be placed in, or removed from, storage only on authority of the District Pool Manager. Arrangements for storage must be made in the most practical manner. The roads holding cars in storage will report monthly the accrued car-days on stored pool cars. District Pool Managers will make report monthly to the Central Pool Bureau for each road in their respective districts. The Central Pool Manager will apportion per diem accruing on stored cars upon the following basis:

(b) The per diem earned monthly by pool cars in authorized storage on all roads holding such cars in excess of ownership responsibility will be summarized and charged monthly among roads holding less than ownership responsibility, on the basis of the relation which the deficiency of each road bears to the total deficiency of all deficient roads. Roads holding cars in storage in excess of ownership responsibility will be credited with the Per Diem accruing on such cars.

Section XXI. District Managers Responsible for Movement Between Roads: All arrangements for movement of empty pool cars between railroad systems to enforce equalization or to meet emergency or additional car demand will be made by District Managers through railroad representatives designated by each railroad system. It will not be permissible for railroads to arrange among themselves for interchange of empty pool cars, except for equalization purposes, without concurrence of the District Managers. If it shall be necessary or desirable to arrange for movement of pool cars between railroads, in the same pool district or between pool districts via other than normal traffic routes, such movement may be ordered by District Managers only after conference of the District Manager with designated representatives of interested roads.

Section XXII. Obligation Members to Hold Surplus Cars Equal to Contribution: It will be the obligation of each railroad system in times of surplus to hold pool cars equal to its unit proportion of the pool, unless the District Manager can provide for an economical disposition, consistent with anticipated future demands. Disposition of surplus cars will be arranged only through the District Offices and designated representatives of railroad systems involved.

Section XXIII. Periodical Interchange Summary Reports: Periodical interchange summary reports will be prepared to show the interchange of pool cars by groups of car ownership marks as among all railroads, these groups to be composed of railroads or railroad systems assigned to each distributive district. When District Managers issue equalization orders through any gateway or interchange point, they must specify the group numbers of the cars to be preferentially applied.

Section XXIV (a). Cars Handled on Switching Tariffs Exempt from Per Diem: Trunk lines, short lines, or switching lines handling cars in terminal or intermediate switching service on a switching tariff allowance, will not be required to pay any charge to the Car Pool for the period the pool equipment is in their possession in such service. The Pool roads for whose account the switching is performed will assume the per diem charge accruing on pool cars while so engaged.

(b) The allowance of switching reclaims between pool participants will be discontinued.

Section XXV. Non-Pool Lines, Short Lines, and Switching Lines: Non-pool lines, short lines, and switching lines making use of pool cars for local traffic, for inter-terminal or intra-terminal service, shall pay to the pool through the appropriate channel, $1.00 per car per day, with no free time allowance.

Section XXVI. Canadian and Mexican Interchange Cars: Cars of ownership other than pool cars (such as Canadian or Mexican railroads) will be handled under Car Service and Per Diem Rules, or such reciprocal arrangements in connection with interchange as may be mutually agreed to. Pool cars on Canadian or Mexican railroads will accrue per diem and will be handled on the basis of Car Service and Per Diem Rules. Compensation for the use of cars will be made to the car owner in accordance with the marks on the car; and will be credited by the car owner to the Car Pool. Repair bills on such cars will be settled by the car owner and charged against the pool.

Section XXVII. Lease of Pool Cars: Pool cars will not be leased, rented or assigned to an industry or any car user for storage, inter-plant or intra-plant movement, or for any transportation service without approval of the car owner and the Manager of the pool.

Section XXVIII (a). Penalty Rule: A railroad participant in the pool, having on line cars in excess of its unit contribution to the pool, and failing to comply with a Pool Manager's order for the delivery of empty cars to another railroad within the period specified by the Pool Manager, shall forfeit to the Pool an amount equivalent to the daily average freight revenue earned by "Active Cars" on its line during the month in which the failure occurs, for each car-day of delinquency in fulfilling the order.

(b) The amounts so collected will be applied as compensation to the roads demanding their quota on the basis of their daily average net revenue per active car-day; any residue to be prorated among all members on the basis of their unit contributions.

Section XXIX (a). General: Until such time as standardization of car design and maintenance has been more nearly

(Continued on page 521)

Motor Transport Section

The Trucks Used Also Advertised the Service

Pennsylvania Sells Storedoor Service

Collection and delivery operations thoroughly publicized among shippers and receivers

WHEN the Pennsylvania decided to inaugurate storedoor collection and delivery service, it was felt that the new service, if properly advertised, would be attractive to shippers and receivers of l.c.l. freight and would result in increased merchandise traffic to the railroad. Half-hearted measures, either as to the service itself or in advertising it, were held to be practically useless, so that a thorough-going publicity and educational campaign was decided upon, the keynote of which has been that there is nothing complex or difficult about the service but that it represents rather a new and simple medium for the rapid, efficient transportation of merchandise in l.c.l. lots. This campaign was started in advance of December 1, 1933, the date that storedoor collection and delivery service was put in operation on the Pennsylvania, and it has been continued ever since, in one form or another.

Intensive Advertising

A survey recently made of the results of this campaign indicates that it was conducted so successfully as to inform fully 99 per cent of the interested shippers and receivers as to the benefits of the new service. In addition, every employee even remotely concerned with the handling or solicitation of this particular class of traffic has been kept fully informed as to all details, so as to be able to give the best of service and intelligent information regarding it. The results, as reported in the *Railway Age* of May 26, have amply justified the expenditures necessary in carrying out this campaign.

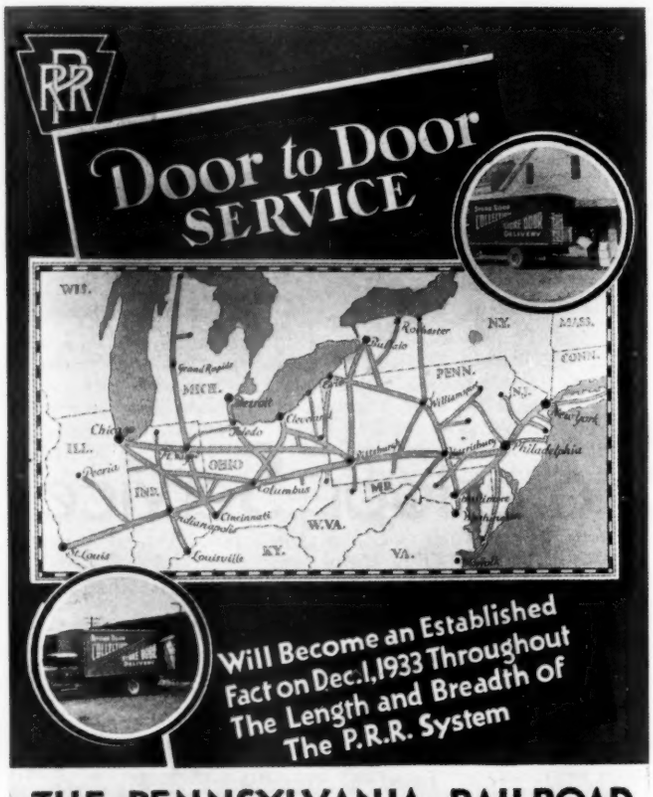
One of the first steps in publicizing this service was the running of a series of advertisements dealing with its features in a number of carefully selected national magazines, this being supplemented by local campaigns in the newspapers of cities served by the Pennsylvania. In each case, several insertions were used, and the copy, prepared by a national advertising agency, specialized in the use of slogans, as well as giving detailed information as to the salient features of the service.

To get still further coverage, posters were put up in all passenger and freight stations, so that visitors to these

Many Thousands of Stickers Were Used in the Publicity Campaign

stations might be thoroughly informed in an attention-compelling manner. All talks made by Pennsylvania officers before local civic bodies also contained some reference to the new service. In addition, the collection and delivery service was featured in Pennsylvania timetables and on dining car menus.

In order to obtain contact with shippers and receivers of l.c.l. freight, pamphlets were printed, with maps showing the principal points where such service applied. The pamphlets also showed the connecting railroads having reciprocal arrangements with the Pennsylvania on this service. A table for the convenient determination of the charges applicable, together with illustrative instances, was included, together with full information as to how to obtain the special service. These pamphlets were mailed to shippers in most cases, but, wherever possible,


Door to Door SERVICE
Will Become an Established Fact on Dec. 1, 1933 Throughout The Length and Breadth of The P.R.R. System
THE PENNSYLVANIA RAILROAD

Pamphlets Were Distributed to Everyone Interested

they were handed to prospective customers in person by Pennsylvania freight solicitors or local agents, these representatives having previously been educated so as to be able to answer any conceivable question the shipping public might ask regarding the service.

Thus, a flood of printed matter, including stickers for placement on orders, advertising the service, was released, but, at the same time, it was so effectively controlled as to reach all the places where it would result in shippers using the service. Supplementing the printed information by personal calls also aided, of course, in accomplishing the task of informing all shippers and receivers as to the service.

Modifications Made

But the Pennsylvania, as it was not satisfied in merely providing the service and letting shippers discover it for themselves, was also not satisfied with merely providing the service and seeing that the shippers were informed. It was felt that, with a service such as this, more or less in the experimental stage insofar as many of its details are concerned, there was room for improvement. Accordingly, taking advantage of the close contact that had been built up between the railway and the users of the new service, the Pennsylvania asked thousands of shippers for suggestions as to how the service, already so popular, might be still further improved. The message to the users was as follows:

Since December 1, 1933, through a co-ordination of railroad and truck transportation, the Pennsylvania has offered a complete door-to-door service by providing for the collection and delivery of l.c.l. freight.

Desiring to keep pace with the requirements of our patrons, and to give them the benefit of improved methods of transportation, the Pennsylvania has been a pioneer in adopting the container, truck-body, and, within limited areas, collection and delivery service, the latter having now been extended to more than 2,000 communities on the railroad. At the time the service was inaugurated, its experimental nature was recognized and its subsequent development is being followed and analyzed.

With an earnest desire to improve this service and adapt it to the requirements of our patrons, we are seeking your frank opinion regarding it and advice as to whether or not you have been able to employ it in connection with your business. With this thought in mind, we have prepared several questions which we are submitting for your consideration and hope you can find it convenient to cooperate in working out this arrangement to the greatest advantage to our patrons and ourselves by answering each of the questions on the enclosed form and returning it to the undersigned.

Questions to Shippers

The principal questions asked were:

Do any provisions of the collection and delivery tariff prevent your making use of our collection and delivery service?

Do the classification requirements for marking, packing and transportation of l.c.l. traffic by rail tend to restrict the use of collection and delivery service as compared with other methods of transportation?

Are you unable to employ our collection and delivery service because it is not as satisfactory as other forms of transportation with respect to time in transit?

Has the adoption of collection and delivery service resulted in an increase of your traffic over the Pennsylvania?

To what extent has collection and delivery service been effective in recovering and retaining traffic for the railroad which would otherwise have been transported by truck?

If you have not made use of our collection and delivery service, kindly state the reasons why it has not appealed to you and favor me with your suggestions as to how any conditions which have prevented its use can be overcome.

The replies received were given most careful consideration and analysis, and, as a result, on July 1 of this year, several modifications and additions were made to the service.

The minimum rate at which the service could be obtained was reduced from 35 cents to 30 cents for 100 lb., while the 25-cent minimum charge for pick-up or delivery on traffic to or from lines not having such service was cancelled entirely. Quite a number of railroads were added, which had agreed to reciprocal arrangements, and interline traffic with such lines is now given the same classification as freight local to the Pennsylvania.

At the same time, restrictions were lifted to permit the use of this service for commodities formerly banned, while the limitations as to the size of articles were modified considerably. In addition, the use of the service was extended to include storedoor collection and delivery of freight on a C.O.D. basis, by extending the tariff to cover "order-notify" shipments.

The Pennsylvania attributes much of the success it has had with the new service to the intensive advertising and educational campaigns conducted for storedoor collection and delivery operations.

Equipment Used in the London-St. Thomas Service

C. N. R. Studies Storedoor Service

Collection and delivery proves successful in experimental area in Western Ontario

Part II

AS a part of the collection and delivery service of the Canadian National Railways, described in Part I of this article, which appeared in the September Motor Transport Section of the *Railway Age*, this railway also indulges in other truck transportation.

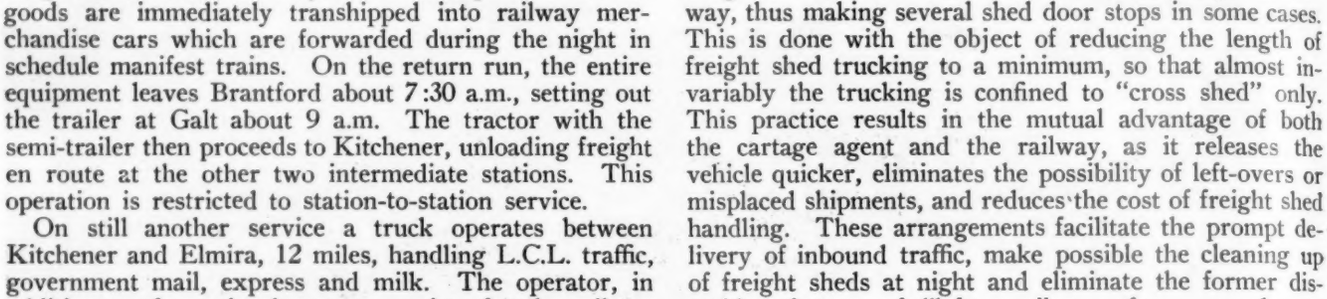
When either improved service or economies or both were evident, the railway instituted station-to-station truck services. These services are operated in each case by reliable and experienced operators owning or controlling the vehicle equipment. The railway does not become involved in any manner in the contract agent's financial position or responsibilities, but naturally seizes every consistent opportunity to advance his interest. These contract agents are paid by the railway, according to the kind and class of services required, mileage operated, class of freight transported, type of vehicle required, and other controlling factors. Usually, the basis of payment is either per trip, per day, per vehicle mile or per 100 lb. They are required, under the railway contract, to take out and keep in force public liability, property damage and cargo insurance to the amounts designated by the railway and to pay the premiums therefor. In each case, the policy or policies are issued in the name of the operator "and/or Canadian National Railway Company." The contract agents are required to file with the railway, a fidelity bond to the amount required by the railway, and to pay the premiums thereof. They are held responsible for all freight while in their custody. They must indemnify the railway against all liability and expense of whatsoever nature for any loss, damage or injury to persons or property in any manner whatsoever occasioned by or incidental to the work undertaken. On the request of the railway and at their own expense, they are further required to paint and to letter their vehicles in a manner designated by the railway.

Toronto, of course, represents the principal point in the experimental area in volume of traffic handled. All inbound L.C.L. traffic for the Toronto district, when waybilled subject to the pick-up and/or delivery tariff, is delivered direct to consignees from Simcoe Street freight shed, except traffic consigned to consignees in some of the remote sections. This traffic is trucked from Simcoe Street to the destination freight shed of the railway, thence delivered to consignees. Outbound traffic is handled somewhat differently. The Toronto district is sub-divided into seven pick-up sections with a collection shed conveniently located in each section. The pick-up vehicles assigned to these respective sections deliver their shipments at the sectional freight shed, where the tonnage, if sufficient, is loaded into railway destination merchandise cars. If there is not sufficient tonnage to warrant a railway car, the traffic is trucked to Simcoe Street shed. Assigned vehicles constantly operate between these sheds, with a last run leaving each shed from 5:45 p.m. to 6:00 p.m.

In another type of service, the freight is handled by a tractor, with a closed type semi-trailer, of nine tons carrying capacity, and a closed type trailer, of eight tons carrying capacity. This equipment is assigned to Kitchener-Brantford service, a distance of 43 miles, serving

three intermediate stations. The tractor with the semi-trailer leaves Kitchener late in the afternoon, receiving freight at two of the intermediate stations, and picks up the trailer at Galt (the trailer is specifically assigned to Galt traffic), thence proceeds to Brantford with all waybills and other necessary transportation documents accompanying shipments. It arrives at the Brantford freight shed of the railway about 8:30 p.m., when the goods are immediately transhipped into railway merchandise cars which are forwarded during the night in schedule manifest trains. On the return run, the entire equipment leaves Brantford about 7:30 a.m., setting out the trailer at Galt about 9 a.m. The tractor with the semi-trailer then proceeds to Kitchener, unloading freight en route at the other two intermediate stations. This operation is restricted to station-to-station service.

On still another service a truck operates between Kitchener and Elmira, 12 miles, handling L.C.L. traffic, government mail, express and milk. The operator, in addition, performs local cartage services for the railway at Elmira. Another truck operates between Kitchener and Waterloo (a municipality immediately adjacent to Kitchener city limits). It handles L.C.L. freight exclusively and does local cartage work for the railway at Waterloo.



Station to Station Trucks Loading at Kitchener

At several other points, notably between London and St. Thomas, 18 miles, trucks and trailers used in station-to-station service also perform pick-up and delivery work at local stations. This combination has proved most efficient and economical.

Freight shed loading schedules have been adjusted in such a manner as to render the quickest possible service consistent with traffic density, and eliminating transhipping en route wherever possible. Traffic for local delivery at the larger stations is loaded, when practicable, into the center of the car, and each end of the car is reserved for transhipment, thus making the local delivery freight immediately accessible upon opening the car at the destination station. By this method, the number of merchandise cars loaded is actually decreased as compared with the previous system, notwithstanding the increased tonnage.

Freight shed employees report for duty as early as 4 a.m. and give preference to unloading local traffic from inbound merchandise cars; this is sorted and made ready for the morning delivery; during the balance of the morning they tranship through freight. Other men report later in the day and are available for afternoon shipping, in some cases, as late as 9 p.m. Freight office clerks report early in the morning for revising and expensing inbound billing, and billing clerks report late in the afternoon to complete outbound billing for the day. Overtime is avoided, except for special cases. Many waybills are forwarded by passenger trains, and arrive at the destination station prior to the arrival of merchandise cars, thus facilitating the necessary clerical work.

At the larger freight sheds, the cartage agents are required to spot their vehicles containing outbound freight at the shed door or doors, as directed by the railway, thus making several shed door stops in some cases. This is done with the object of reducing the length of freight shed trucking to a minimum, so that almost invariably the trucking is confined to "cross shed" only. This practice results in the mutual advantage of both the cartage agent and the railway, as it releases the vehicle quicker, eliminates the possibility of left-overs or misplaced shipments, and reduces the cost of freight shed handling. These arrangements facilitate the prompt delivery of inbound traffic, make possible the cleaning up of freight sheds at night and eliminate the former disturbing feature of "left over" cars from one day to another. Schedules, so far as practicable, have been adjusted to present demands and all through merchandise cars are forwarded in scheduled manifest trains and make connection at intermediate junctions with way freight trains.

Merchandise cars are placed at freight sheds promptly upon arrival and freight sheds are not switched, except for the occasional car required for earlier departure manifest trains, until late in the evening. Outbound merchandise cars are set at the larger sheds in train and station order assignment.

In a selected area, within the experimental area, further experiments have been conducted by distributing l.c.l. freight from branch line passenger trains. These services are restricted to traffic originating at two of the larger stations. In March of this year, one of the stations reported an increase in traffic over last year of 338.4 per cent and the other an increase of 113.7 per cent; in April these increases were 132.2 per cent and 88.1 per cent, respectively. The passenger trains concerned depart from traffic-originating stations after the day's shipping is completed, and all traffic reaches its destination the same evening, with delivery effected not later than the following morning.

The rate scale of the experimental system, approximating the rail third class station-to-station rates, has naturally increased the volume of rail traffic classifying higher than third class, in greater proportion than that classifying lower; for example, in April, 1934, first class tonnage increased 52.6 per cent; second class 32.0 per cent; third class 24.9 per cent and fourth class and lower

13.3 per cent over the previous year. This increase in higher classified traffic has proved disturbing to the highway truckers, in that it shortens their distance for profitable operation, owing to the fact that they cannot secure traffic at rates higher than the rail experimental rates.

The increase in higher classified traffic by no means indicates that the experimental single rate system is being applied solely to shipments of a light or bulky nature, or to shipments that would have otherwise been forwarded by express, for the average weight per shipment only decreased 43 lb. during the first year, and this decrease, to some extent at least, may reasonably be due to conditions beyond the control of the railway. This is further evidenced by the fact that in April, 1934, 98.4 per cent of the first and higher classified traffic, 98.2 per cent of second class, 86.7 per cent of third class and 21.4 per cent of fourth class traffic was waybilled at pick-up and delivery rates.

During the first year, consignments increased by 60,000, equivalent to 35 per cent, the average weighted revenue per 100 lb., exclusive of cartage, decreased 1.6 cents, and cartage costs per 100 lb. originated averaged 4.1 cents. The freight office unit cost, per consignment, at the larger stations, decreased 2.9 cents and the shed unit cost per ton handled decreased 3.4 cents, as compared with the previous year.

Conclusions

The experiment has not only proved profitable to the railway and its contract agents, but profitable also to the users of transportation. It is by no means a remedy but a forward development, in its relation to modern distribution methods. It is not conceivable to believe that one year's experimentation affords sufficient time in which to adjust the complex and complicated problem. The transport industry, uncontrolled, unregulated and uneconomic as it is, naturally puts forth every effort to resist the advances made by the Canadian National to recover traffic, and strives to maintain its existence by rate reductions, regardless of cost.

The experimental system in its present form is restricted more or less to competition with the so-called common carrier truckers who devote almost their entire energy and efforts to the solicitation and distribution of less-carload traffic. To secure traffic of the larger and heavier shipments regularly trucked by the other classified truckers, presents a problem for further experimentations, in that the latter's costs are, by reason of the nature of the services they render, less than the common carriers' costs, and this factor must, of necessity, be recognized by the railways in determining a broader experimental policy.

The entire arrangement has been worked out under the supervision of W. A. Kingsland, vice-president and general manager of the Central region of the C.N.R.

Box Car Pool Proposed

(*Continued from page 516*)

achieved, it shall be the duty of the Pool Management, so far as practicable, to confine pool cars to their owner's rails where they may be more economically repaired and best serve the interests of the railroad and the public.

(b) In the distribution of pool cars, it shall be the duty of the Pool Management, as far as possible, to eliminate empty cross-haul, and to relocate cars into originating territory with the minimum out-of-pocket expense to the carriers as a whole. To the extent that relocation is accomplished by the use of short-routing, the equalization of loaded and empty car mileage through specific junctions and over specific roads will be affected. It shall be the obligation of the Pool Management to adjust any inequalities arising from short routing operations so as to fairly apportion the burdens and benefits of such operations. The maximum rate to be paid any railroad for an excess movement of empty pool cars incident to the short-routing, shall be six cents per car-mile, plus bridge and terminal arbitraries. Per diem charges accruing while such cars are en route will be assumed by the carrying line.

Following are some extracts from the discussion as to the need for a pooling plan:

Efforts to Correct Conditions. In recent years, concentration upon the solution of defects in car handling methods has been somewhat relaxed. The marked improvement in conditions and the elimination of car shortages, due largely to the expansion of facilities during the period 1923-1927, has been generally accepted as demonstrating the soundness of the basic principles of the existing method of car service regulation.

The mounting empty mileage ratio has been recognized, but its importance has been minimized. Efforts to apply general corrective measures have been limited to temporary and partial departures from the principles of the rules, or campaigns for better observance of the rules. Instances of these attempts to reduce empty mileage are found in the Car Service Division Orders prohibiting the empty return of cars of certain railroads or into certain regions; experiments in mutual storage or per diem offsetting arrangements, and the operation of reciprocal "short routing" agreements between groups of railroads.

It has been the endeavor of the Section of Car Pooling to develop a plan for a general freight car pool which will apply to the regulation of interchange between railroads the principles and methods which are universally applied in the local and divisional car distribution on single railroad systems, with proper safeguards for the rights and responsibilities of participants in the pool. The perfection and adoption of such a plan by the railroads of the United States will unquestionably result in the avoidance of much unnecessary empty car mileage now being created in the return of cars on the basis of their initials—with consequent savings in operating expenses. The principal items in which savings may be effected are:

Possible Savings

(a) The elimination of crosshaul empty movement;

(b) Reduction in the empty mileage necessary in balancing traffic through the "short-routing" of empties;

(c) Reduction in repair costs by the elimination of unnecessary car movements in both yard and road service.

(d) Further savings in car maintenance by the eventual utilization of the most economical facilities for repairs to pool cars.

(e) Reduction in capital carrying costs by a decrease in the number of cars required to fill traffic needs. (The minimum reduction on box cars is estimated at 10 per cent of present ownership.)

(f) Lowering the unit cost of freight cars by stabilizing purchases and further standardizing equipment.

(g) Reduction in accounting cost incident to the settlement of car repair bills and per diem accounts on the basis of the individual car.

A conservative estimate of the savings in operating expense which can ultimately be effected through the pooling of box cars alone is $50,000,000 per annum. On the basis of current prices for new cars, the saving in investment would be in excess of $200,000,000, the carrying charge on which exceeds $15,000,000 per annum. The total estimated saving on box cars is therefore $65,000,000. By the ultimate pooling of all types the saving should exceed the estimate for box cars alone by 50 to 60 per cent, a total possible saving of $100,000,000 per year.

The savings in capital carrying charges will not be immediately realized, except to the extent that the purchase of additional cars is deferred by reason of the pool operation. The savings in operating costs will also be partially postponed by the restrictions in the Emergency Act of 1933 against the displacement of railroad labor.

The effect of the reductions in empty movement on train service, shop and other employees will be indirect and as a consequence it is impossible to determine what proportion of the total anticipated saving will be at the expense of labor. Assuming the maximum application of the labor restrictions during the early period of pool operation, it is estimated that no more than 45 per cent of the estimated saving would be subject to the restrictions, this ratio decreasing as railroad traffic increases or as the restrictions become less effective.

NEWS

Railroad Brief Opposes Canal Across New Jersey

Carriers join in presentation to special board of engineers now studying project

Railroads serving New York and Philadelphia have filed with the special board of engineers, which is investigating for Congress the economic advisability of canal across New Jersey, a brief in opposition to any favorable report on the waterway project. The carriers contend that the construction of the proposed canal is not economically justified because: (1) It is not needed; (2) its possible use would not justify its cost; (3) it is not justified as a relief measure; (4) its construction would positively conflict with the public interest, in that (a) it would either enormously burden the taxpayer, or (b) it would undermine the service and solvency of the railroads.

The special board which is making the current study was directed to do so last March by the rivers and harbors committee of the house of representatives. Its survey follows repeated investigations by various groups of United States army engineers who have, on several occasions, reached the general conclusion that the project was not economically justified.

The brief establishes at the outset the interest of the railroads in the premises, pointing out that as common carriers they are obligated to provide adequate year-round service in the territory involved; as investors they would be injured; and as taxpayers they have a legitimate interest in opposing improvident public expenditures, especially those constituting subsidies to their competitors.

The proposed canal would extend across the State of New Jersey from Raritan bay, the most westerly arm of New York harbor via the Raritan river to Sayreville, thence via South river to a point near Old Bridge, thence via Spotswood, Helmetta, Jamesburg, Cranberry and Edinburg, to the Delaware river at Bordentown, four miles below Trenton. The canal proper, extending from Sayreville to Bordentown, would be 31.5 mi. long; the northern approach 7 mi. long; and the Delaware river approach from Philadelphia to Bordentown, 26 mi. long. Thus the total length of the proposed new channel would be 64.5 mi. and the total distance via the canal from Philadelphia to New York would be 87 mi.

The construction cost is estimated by the board of engineers at $210,000,000 exclusive of right of way and disposal areas. The railway brief regards this as an ultra-conservative estimate, but it nevertheless makes the project comparable only with the Panama Canal, which was originally estimated to cost $160,000,000 or about $4,000,000 per mile, whereas the New Jersey project, on the basis of the $210,000,000 estimate, would cost over $6,000,000 per mile. Furthermore, in this connection the brief at a later point, notes the fact that "preliminary estimates for waterway improvements have commonly proved to be far less than actual cost." It cites examples of notorious under-estimates of cost and also of freight available for projected inland waterway routes.

A few visible items of substantial expense omitted from the $210,000,000 estimate are added to bring the estimated cost up to $242,000,000. Then the total cost per ton on freight that might use the proposed waterway between New York and Philadelphia is computed, it being estimated that less than 2,500,000 tons would move annually. Against this tonnage is applied the annual interest and amortization charge of $12,100,000; maintenance and operating expenses of $1,020,000; and freight charges of $1,000,000. This averages $5.64 per ton as against an average rail rate of less than $1 per ton from New York to Philadelphia. Even if the largest suggested annual tonnage—12,500,000—should move through the canal the total cost per ton from New York to Philadelphia would be $1.44. Thus, the brief points out that when it is said that the canal would reduce transportation costs "it becomes clear that what is meant is not that there would be any reduction in cost, but only that the canal would provide transportation *below cost* for the *favored shippers* who could use it and the resulting deficit would be paid by taxation."

Other sections of the brief point to the adequacy of rail facilities in the territory involved; the growth of highway and pipe line competition; and the unsoundness of the proposed canal as a relief project. In this latter connection it quotes Senator Wagner of New York, who, in opposing the St. Lawrence Seaway, said that "waterway construction is one of the least successful methods of giving men jobs." The idea that the Atlantic Intercoastal Waterway "System" awaits for its complete development only the construction of the New Jersey canal—its "missing link"—is disposed of with a tabulation showing the depth of existing units of the "system." This reveals that 736 mi. or about three-quarters of the "alleged waterway system" has a depth of only 8 ft. or less. The only existing part comparable to the proposed New Jersey canal is the Cape Cod canal.

Railroad Retirement Act Is Held Unconstitutional

Chief Justice Wheat of District of Columbia Supreme Court renders opinion

The railroad retirement act was held unconstitutional in a memorandum opinion rendered on October 24 by Chief Justice A. A. Wheat of the supreme court of the District of Columbia on the grounds that it extends its provisions to persons not engaged in interstate commerce and that it takes the property of the railroads without due process of law.

No order was issued at the time on the railroads' application for an injunction pending a conference with counsel. The justice said he had merely outlined his conclusions in the memorandum without taking the time for an elaborate discussion, for he realized the importance to all of an immediate decision. Under the law the railroads would have been required to pay to the Treasury of the United States on November 1 approximately $15,000,000 as the first quarterly installment of their contribution.

"I am not prepared to say that the enactment of a statute providing for the compulsory retirement at a certain age of employees of railroads engaged in interstate commerce, together with provisions for the pensioning of employees so retired is beyond the power of Congress under the interstate commerce clause of the Constitution," the court said. "Congress has power to regulate the relation of master and servant between interstate carriers and such of their employees as are actually engaged in interstate commerce. The fact that so many of the plaintiff carriers have for many years maintained voluntary retirement and pension systems furnishes persuasive evidence of their belief that such systems tend to promote the efficiency of their personnel by stimulating loyalty, encouraging continuity of employment with resulting security for old age, and thus increasing the morale of those in the organization. It is argued, however, that the features of the voluntary pension systems which tend to promote these desirable ends not only are absent from the retirement act but that it contains other provisions wholly subversive of those ends. It is said that the act being mandatory upon the carrier relieves the employee of any feeling of gratitude or loyalty which naturally is felt toward a benefactor; that it does not promote continuity of service because the benefits of the Act do not depend upon any length

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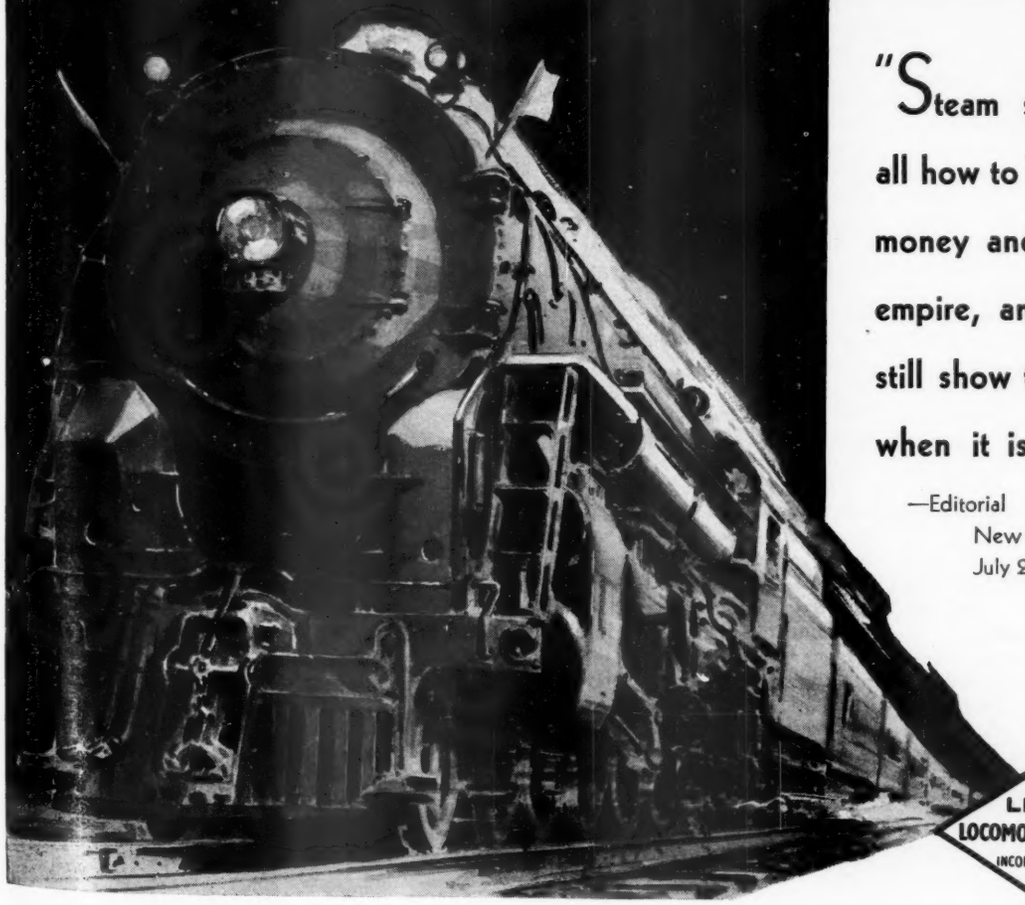
Steam

FOR SPEED, RELIABILITY AND ECONOMY



"Steam showed them all how to haul, to make money and to build an empire, and steam can still show them its heels when it is of a mind."

—Editorial
New York Herald Tribune
July 27, 1934.

LIMA LOCOMOTIVE WORKS INCORPORATED

of service in any particular employment or by any particular employer; so that there is no incentive for an employee to remain continuously in the service of any particular carrier; that the right to receive the annuity in no way depends upon efficient and faithful performance of duty, and that the benefits of the act are shared equally by all employees even those discharged for cause.

"These matters, however, seem to me to involve questions of wisdom and propriety rather than of power and to be for the consideration of the Congress rather than of the courts.

"When the act is examined in detail, however, I find it contains provisions which, in my opinion, were beyond the power of Congress and which render it unconstitutional.

"In the first place, the act is unconstitutional because it extends its provisions to persons not engaged in interstate commerce.

"The Retirement Act confers its benefits upon all employees of any company to which it relates without regard to distinction between interstate commerce, intrastate commerce, or activities which do not constitute commerce at all.

"It was held in the Employers' Liability cases, 207 U.S. 463, that one who engages in interstate commerce does not submit all his business concerns to the regulating power of Congress and that an attempt on the part of Congress to extend its regulatory powers to all employees of an interstate carrier regardless of their duties and the work performed by them made the act invalid. The present act applies to all employees of the plaintiffs. Indeed there is no claim that it does not. It appears from the record in this case that some 200,000, approximately one-fifth of all the employees of the plaintiffs, do not work in interstate commerce or in work so closely connected therewith as to be a part thereof. Among these men may be mentioned mechanical employees; executive and general officers and their staffs, not including the operating vice presidents and their staffs; those engaged in accounting not having a direct relationship to interstate transportation; those engaged in the construction of buildings, or the construction of new equipment; those who devote themselves to finances, custody and administration of funds or corporate proceedings and records; those engaged exclusively in work relating to real estate taxes and titles, in the management, operation, care and protection of buildings or lands not devoted to or used in connection with transportation and men employed in coal mines. As to some of these men, there may be room for differences of opinion as to their proper classification, but it is plain that there are many who are not in any real sense engaged in interstate commerce.

"The proof shows that the Long Island Railroad Company, whose lines are wholly within the state of New York, the Illinois Central Railroad, and the New York Central Railroad have a large number of employees engaged solely in intrastate service. It appears that the New York, New Haven & Hartford Railroad has physical property of the value of more than $7,000,000 which the Interstate Commerce Commission has classified as non-carrier. The New York Central has property in excess of $43,000,000 so classified. The Pennsylvania Railroad Company has $17,000,000, and the Union Pacific, $19,000,000. The employees engaged in work in connection with this property are included as beneficiaries of the act.

"It seems to me that Congress exceeded its power to regulate interstate commerce, when it attempted to make all employees of the plaintiffs beneficiaries under this act, making no distinction between those engaged in interstate commerce and those not so engaged.

"Section 1 of the act includes as employees entitled to its benefits everyone who has been in such service within one year before the enactment thereof. The evidence discloses that about 143,000 men left the service of the railroads during that year and were not in such service on the date of enactment and that of this number approximately 80,000 probably will not return to the railroad service. Some of these men were dismissed for the good of the service. I can see no reasonable relation between giving these men the benefits of the act, and the regulation of interstate commerce.

"Furthermore, the act provides annuities for all persons who, at the time of its enactment, were, or within the period of one year before its enactment had been, in carrier service and who had attained or thereafter should attain, the age of 65 years, or had completed or thereafter should complete 30 years of such service. The right to the annuities is not dependent upon the rendition of service subsequent to enactment and the computation of the annuities is not confined to service rendered subsequent but includes service rendered prior thereto.

"The defendant Latimer, in his affidavit, shows that upon the assumption of the retirement at 65 of such of the present employees of the carriers as, on an expectancy basis, survive to that age, the gross annuities required by the statute to be paid to them for services rendered prior to the enactment of the law will amount in the aggregate to over four billion dollars.

"The statute provides that upon the reemployment hereafter by any carrier of any man previously in railroad service all of his prior service is to be counted as part of the service entitling him to the annuity. The evidence tended to show that there are today over a million persons with that possibility.

"To require the plaintiffs to contribute huge sums of money to be devoted to the payment of pensions or annuities based upon services long since completed and fully paid for seems to me to take their property without due process of law.

"I am constrained, therefore, to hold that the act is unconstitutional.

"The natural reluctance which a judge feels when compelled to hold an act of Congress unconstitutional is in this case somewhat tempered by the fact that the act seems not to be satisfactory even to some who favor it in principle and purpose. When the President gave his approval, he made a statement explaining his action in which he said, among other things:

"'Decision on this bill has been difficult.'

"He gave as among the 'principal arguments against the measure':

"'(a) The Federal Coordinator of Transportation at much public expense is now engaged in a thorough survey of the whole subject of employment security on railroads. He requested many months ago that legislation be deferred until the completion of these studies and the filing of his report.

"'(b) The bill, although much improved in its final form, is still crudely drawn and will require many changes and amendments at the next session of Congress.'

"A decree will be made in favor of the plaintiffs, granting the relief prayed for in the bill."

Correction

W. H. Failing, claims attorney of the Central of New Jersey, was elected second vice-president of the Safety section of the American Railway Association at its annual meeting at Cleveland, Ohio, on October 2-4, instead of C. T. Bailey, as reported in the *Railway Age* of October 13.

Club Meetings

The New England Railroad Club will hold its next meeting at Copley-Plaza Hotel, Boston, on Tuesday, November 13, at 6:30 p.m. H. S. Clarke, engineer, M. W., Delaware & Hudson, will speak on "M.W. Men Cannot Rest in an Established Practice."

The Washington Transportation Club gave a farewell dinner on October 18 in honor of Frank E. Pennington, general agent of the Missouri Pacific in Washington, who has been promoted to general agent at Pittsburgh.

Truck-Competitive Rates Suspended

The Interstate Commerce Commission has suspended from October 25 until May 25, 1935, the operation of certain schedules as published by the Pennsylvania, Baltimore & Ohio, and other carriers proposing to reduce the rates on fresh meats, packing house products and dairy products, carloads, from Chicago, Ill., to Fostoria and Akron, Ohio, to meet purported motor truck competition. In some instances the rates are restricted so as not to be used as factors in constructing through rates on combinations from and to other points.

Clement and Palmer New Members of Eastern Co-ordinating Group

M. W. Clement, vice-president of the Pennsylvania and H. S. Palmer, newly-elected president of the New Haven, have been chosen as members of the Eastern Regional Co-ordinating Committee to succeed, respectively, W. W. Atterbury, president of the Pennsylvania, and J. J. Pelley, president of the Association of American Railroads. Messrs. Clement and Palmer were selected at a meeting of the Eastern Presidents' Conference in New York last week. Mr. Atterbury resigned because he has been in ill health of late and has thus been prevented from attending to the regional committee affairs; Mr. Pelley's

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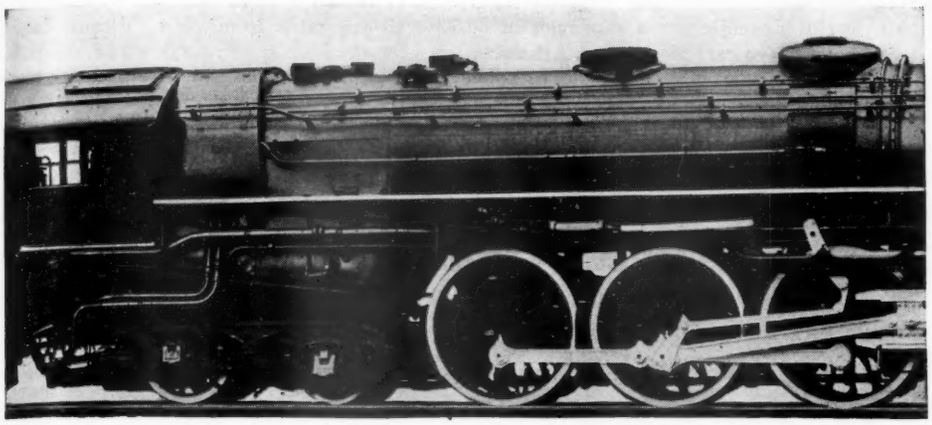
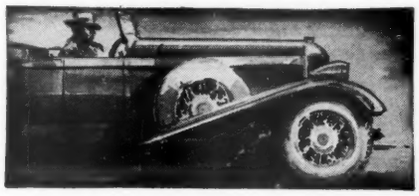
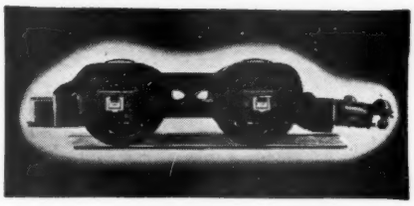
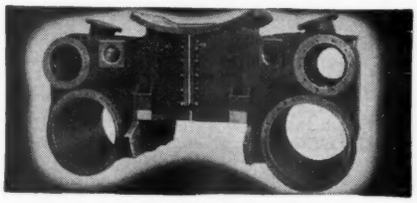


The *Double* Power Locomotive



If you could shift your locomotive into low at starting, the way you do your car, you could reduce the size of cylinders and save a lot of locomotive weight and maintenance. • In effect the Booster does this. It provides the extra "pull" in starting that permits use of smaller cylinders. • Smaller cylinders naturally mean lower maintenance due to a reduction in the amount of work done. • This saving in itself is more than enough to justify application of The Locomotive Booster. • Build better, not bigger locomotives.





Booster repair parts made by the jigs and fixtures that produced the original are your best guarantee of satisfactory performance.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

resignation was submitted as a result of his leaving the New Haven to assume his new duties with the A. A. R.

Competitive Rates on Sugar Authorized

Division 2 of the Interstate Commerce Commission has authorized the railroads to establish and maintain rates on sugar, in carloads, subject to a minimum of 80,000 pounds per car, from north Atlantic ports and points grouped therewith to points in Illinois, Indiana, and border points in adjacent states, without observing the long-and-short-haul provision of section 4 of the interstate commerce act. The purpose of the relief is to meet the competition of all-rail rates from New Orleans, La., to the destination territory, which reflect the competition of barge and barge-truck routes from New Orleans to that territory, without reducing the rates to intermediate points not affected by that competition. Commissioner Tate dissented.

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled From 147 Monthly Reports of Revenues and Expenses Representing 149 Class I Steam Railways

FOR THE MONTH OF AUGUST, 1934 AND 1933

Item	United States		Eastern District		Southern District		Western District	
	1934	1933	1934	1933	1934	1933	1934	1933
Average number of miles operated	239,113	240,654	59,184	59,444	45,440	45,705	134,489	135,505
Revenues:								
Freight	$224,837,073	$241,255,455	$87,831,105	$106,170,341	$41,676,346	$46,492,733	$95,329,622	$88,592,381
Passenger	32,801,439	32,241,974	19,267,916	19,397,052	3,816,065	3,435,507	9,717,458	9,409,415
Mail	7,208,605	7,396,131	2,789,422	2,921,935	1,261,679	1,240,822	3,157,504	3,233,374
Express	4,526,467	3,087,379	2,133,395	1,423,248	458,086	393,261	1,934,986	1,270,870
All other transportation	6,546,003	6,690,038	3,259,127	3,677,210	581,323	563,008	2,705,553	2,449,820
Incidental	6,094,082	5,826,989	3,010,501	3,083,816	792,120	732,612	2,291,461	2,010,561
Joint facility—Cr.	837,242	720,835	255,760	230,159	197,977	188,316	383,505	302,360
Joint facility—Dr.	171,482	187,908	49,072	46,456	18,276	21,184	104,134	120,268
Railway operating revenues	282,679,429	297,030,893	118,498,154	136,857,305	48,765,320	53,025,075	115,415,955	107,148,513
Expenses:								
Maintenance of way and structures	34,195,831	32,773,968	13,635,041	13,731,259	6,135,336	6,200,731	14,425,454	12,841,978
Maintenance of equipment*	53,241,981	55,536,120	22,580,385	25,853,910	9,766,681	10,322,339	20,894,915	19,359,871
Traffic	7,639,322	7,181,893	2,976,887	2,697,793	1,418,290	1,292,162	3,244,145	3,191,938
Transportation	98,814,643	93,127,844	44,507,007	44,138,268	16,065,082	15,257,648	38,242,554	33,731,928
Miscellaneous operations	2,460,284	2,141,021	1,143,485	1,065,226	234,282	224,457	1,082,517	851,338
General	‡ 15,684,885	§ 11,906,375	6,441,991	5,158,918	2,537,015	2,083,992	6,705,879	4,663,465
Transportation for investment—Cr.	330,688	196,506	71,275	47,368	32,068	17,526	227,345	131,612
Railway operating expenses	211,706,258	202,470,715	91,213,521	92,598,006	36,124,618	35,363,803	84,368,119	74,508,906
Net revenue from railway operations	70,973,171	94,560,178	27,284,633	44,259,299	12,640,702	17,661,272	31,047,836	32,639,607
Railway tax accruals	20,590,708	22,696,942	9,049,516	9,851,821	3,796,270	4,142,716	7,744,922	8,702,405
Uncollectible railway revenues	104,293	113,409	60,077	55,545	19,729	10,501	24,487	47,363
Railway operating income	50,278,170	71,749,827	18,175,040	34,351,933	8,824,703	13,508,055	23,278,427	23,889,839
Equipment rents—Dr. balance	7,554,232	7,150,829	3,641,309	4,411,333	271,881	*d 171,426*	3,641,042	2,910,922
Joint facility rent—Dr. balance	3,046,601	3,197,014	1,717,433	1,762,213	365,754	394,116	963,414	1,040,685
Net railway operating income	39,677,337	61,401,984	12,816,298	28,178,387	8,187,068	13,285,365	18,673,971	19,938,232
Ratio of expenses to revenues (per cent)	74.89	68.16	76.97	67.66	74.08	66.69	73.10	69.54
* Includes:								
Depreciation	15,378,771	15,329,890	6,847,273	6,291,118	2,851,391	2,987,458	5,680,107	6,051,314
Retirements	759,662	1,381,440	63,116	945,488	150,040	102,482	546,506	333,470

FOR EIGHT MONTHS ENDED WITH AUGUST, 1934 AND 1933

Average number of miles operated	239,294	241,132	59,206	59,579	45,458	45,809	134,630	135,744
Revenues:								
Freight	$1,766,199,374	$1,616,243,936	$765,207,111	$693,929,063	$350,444,552	$333,019,972	$650,547,711	$589,294,901
Passenger	230,179,245	213,208,814	138,228,622	127,325,192	29,794,488	25,273,116	62,156,135	60,610,506
Mail	59,385,135	59,908,137	23,032,594	23,497,878	10,454,758	10,287,213	25,897,783	26,123,046
Express	35,746,897	28,567,382	14,972,205	11,948,202	7,247,580	5,789,292	13,527,112	10,829,888
All other transportation	49,895,086	47,640,104	26,160,230	26,656,898	4,638,343	4,192,806	19,096,513	16,790,400
Incidental	42,580,028	36,615,032	22,848,396	20,494,422	6,210,788	5,297,546	13,520,844	10,823,064
Joint facility—Cr.	6,089,660	5,380,824	1,887,411	1,727,365	1,437,016	1,238,252	2,765,233	2,415,207
Joint facility—Dr.	1,515,379	1,486,761	405,662	403,521	132,326	148,890	977,391	934,350
Railway operating revenues	2,188,560,046	2,006,077,468	991,930,907	905,175,499	410,095,199	384,949,307	786,533,940	715,952,662
Expenses:								
Maintenance of way and structures	248,157,618	210,706,940	99,678,452	83,406,801	47,723,237	42,706,730	100,755,929	84,593,409
Maintenance of equipment†	435,314,594	386,003,486	197,289,626	172,553,003	81,710,134	73,295,006	156,314,834	140,155,477
Traffic	59,594,110	57,034,522	22,570,985	21,136,103	11,314,037	10,887,103	25,709,088	25,011,316
Transportation	772,116,176	703,720,705	364,620,164	327,072,500	129,107,233	119,215,252	278,388,779	257,432,953
Miscellaneous operations	17,746,020	15,078,367	8,680,594	7,571,690	2,119,608	1,768,151	6,945,818	5,738,526
General	‡ 101,470,182	§ 95,718,413	44,155,187	41,161,918	17,125,001	16,354,922	40,189,994	38,201,573
Transportation for investment—Cr.	1,921,610	1,814,979	552,389	668,844	211,598	203,205	1,157,623	942,930
Railway operating expenses	1,632,477,090	1,466,447,454	736,442,619	652,233,171	288,887,652	264,023,959	607,146,819	550,190,324
Net revenue from railway operations	556,082,956	539,630,014	255,488,288	252,942,328	121,207,547	120,925,348	179,387,121	165,762,338
Railway tax accruals	169,691,083	177,567,141	71,340,138	72,951,448	33,371,194	34,009,065	64,979,751	70,606,628
Uncollectible railway revenues	781,857	678,283	419,211	286,473	128,206	82,159	234,440	309,651
Railway operating income	385,610,016	361,384,590	183,728,939	179,704,407	87,708,147	86,834,124	114,172,930	94,846,059
Equipment rents—Dr. balance	60,702,985	56,369,907	30,264,873	29,052,525	4,723,466	3,852,897	25,714,646	23,464,485
Joint facility rent—Dr. balance	24,204,890	24,165,770	13,373,646	12,985,767	2,981,836	2,718,423	7,849,408	8,461,580
Net railway operating income	300,702,141	280,848,913	140,090,420	137,666,115	80,002,845	80,262,804	80,608,876	62,919,994
Ratio of expenses to revenues (per cent)	74.59	73.10	74.24	72.06	70.44	68.59	77.19	76.85
† Includes:								
Depreciation	123,685,256	120,349,591	54,624,298	47,510,603	23,160,259	24,075,345	45,900,699	48,763,643
Retirements	3,548,236	9,197,950	803,110	7,210,433	1,231,191	629,568	1,513,935	1,357,949

‡ Includes accruals on account of pensions, as follows: Under Federal Retirement Act, $3,871,955; under previously existing plan, $23,134,179.
§ Includes accruals on account of pensions, under previously existing plan, $22,072,106.
d Deficit or other reverse items.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Continued on next left-hand page

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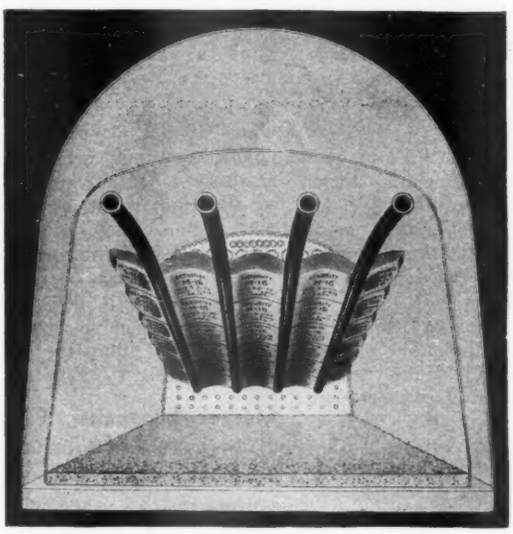

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Interest Rate on Loans to Railroads May Be Reduced

A new program of loans to railroads for maintenance and equipment through the Public Works Administration is under consideration for next year and President Roosevelt stated on Wednesday that in all likelihood the interest rate on such loans would be reduced from 4 per cent to something like 3½ per cent. He indicated that the government is willing to make loans to railroads, as one way of stimulating the capital goods industries, but that this depends on the situation of the railroad and that adequate security would be required.

Dr. Hermann von Schrenk Elected President of A. S. T. M.

Dr. Hermann von Schrenk, consulting timber engineer, St. Louis, Mo., who acts in this capacity for a number of railroad systems, has been elected president of the American Society for Testing Materials, to fill the vacancy caused by the death of W. H. Bassett on July 21. Dr. von Schrenk, who, at the time of his appointment was senior vice-president of the Society, has been a member since 1903.

Procedure Approved for Trucking Industry Rate Complaints

Regulations for filing and handling rate and tariff complaints in the trucking industry have been approved by the National Industrial Recovery Board. The industry's code provides that rate and tariff complaints are to be passed upon by state code authorities, subject to appeal to the board. The approved procedure requires the state code authorities to consider complaints at public hearings, unless a member against whom complaint has been filed refutes it without a hearing or files new and corrected rate schedules. Either party to a complaint may appeal the state code authority's decision to the National Industrial Recovery Board. Members against whom complaint has been filed must submit cost statements based upon the code's approved "Cost Formula."

Accident Bulletin No. 102

The record of railroad accidents for the year 1933, as issued by the Interstate Commerce Commission, in advance sheets, last May, was abstracted in the *Railway Age* of May 5, page 660. The total number of persons killed on the railroads of the country in the 12 months was 5,019, and of injured 27,494. The complete bulletin, a pamphlet 9 in. x 12 in., of 95 pages, has now been issued. From this, it appears that 415 persons who had been reported as injured were subsequently reported as having died, of which number 15 had been injured in train accidents. Of the 15, two were passengers on trains, which raises the total passengers fatally injured in train accidents in that year from 23 to 25.

The total number of train accidents in 1933 was 5,623, and the damage to railroad property in connection therewith was $8,091,645; total persons killed in train accidents 218, injured 1,365. This loss of eight millions compares with a total in 1932 of $9,607,085.

Of the 95 pages in this bulletin, 36 pages are filled with tables showing in great detail the injuries to persons under a multitude of classes, and also by roads.

The accident record for 1932 was noticed in the *Railway Age* of April 22, 1933, page 594, and September 30, page 472.

N.R.A.A. Formulates Plans for Exhibit

At a meeting of the executive board of the National Railway Appliances Association at Chicago on October 22, called to fix the date for the allotment of space for the exhibit which will be held at the Coliseum, Chicago, on March 11-14, 1935, during the convention of the American Railway Engineering Association, it was decided that this date should be fixed as November 12. On that date the Executive committee will allocate space to member applicants.

Seventy companies have qualified for membership to date, 40 of whom have already filed applications for space while some 20 additional applications are in process of filing, several of these companies applying for larger amounts of space than they took at the last exhibit.

With the American Railway Engineering Association returning to a three-day convention and with the expectation that the signal men will again meet in Chicago as it did last March, it is expected that the exhibit will again take on the interest that formerly attached to it as an essential feature of engineering week in Chicago.

Canadian Railroad Y. M. C. A. Secretary

Effective October 1, Adams S. McAlister, railroad secretary of the Canadian Lines, National Council, Y. M. C. A. of Canada, retired, and was succeeded by E. D. Otter, who as a field secretary of the National Y. M. C. A. Council of Canada, has given special attention to program service among railroad and industrial employees.

Mr. McAlister had held the position from which he has retired since 1925. Prior to entering Y. M. C. A. work he was employed from 1891 to 1899 in construction and car department work. From 1899 to 1913 he served as a railroad Y. M. C. A. secretary; and for the next seven years as a territorial secretary, following which, until 1925, he was the general secretary of a city association.

Mr. Otter was born January 12, 1885, receiving his education at the public schools and McAlister University. He served in the Y. M. C. A. as boys' work secretary at Toronto from 1910 to 1912; general secretary, Pembroke, Ont., 1912-15; overseas service, 1917-19; and executive secretary at Toronto, 1919-25, after which he took the position he has just relinquished in succeeding Mr. McAlister.

Mediation Board Certifies Employee Representation

The National Mediation Board has issued certifications in cases of disputes referred to it as to the organization duly designated to represent various classes of railroad employees, on the basis of secret ballots taken under its supervision, as follows:

That the Railway Employees' Department of the American Federation of Labor has been authorized to represent the boilermakers and sheet metal workers on the New York, New Haven & Hartford but that in other shop crafts neither contesting organization received a majority of the eligible votes. A large number of votes were cast for the Mechanical Department Association, New Haven System.

That the National Organization Masters, Mates and Pilots of America has been authorized to represent the masters, mates, and pilots of the Pennsylvania in the Port of New York area; that the National Marine Engineers Beneficial Association has been authorized to represent the marine engineers of the Pennsylvania in the Port of New York area, and that the International Longshoremen's Association has been authorized to represent the lighter captains of the Pennsylvania in the Port of New York area.

That the Brotherhood of Railroad Trainmen has been authorized to represent the motormen, conductors, brakemen, flagmen, and switchtenders on the Pacific Electric Railway.

Eight Roads Take Up Plan to Divide Minneapolis & St. Louis

Officers of eight railroads, the Chicago & North Western; the Chicago, Milwaukee, St. Paul & Pacific; the Chicago, Rock Island & Pacific; the Chicago, Burlington & Quincy; the Illinois Central; the Chicago Great Western; the Great Northern and the Wabash, met in Chicago on October 19 to discuss the practicability of buying the Minneapolis & St. Louis for division among them in line with the suggestion made several days previously by Jesse H. Jones, chairman of the Reconstruction Finance Corporation.

Previous to the suggestion made by Chairman Jones, a reorganization committee of the Minneapolis & St. Louis had been working on a plan for re-establishment of the company through the aid of an R.F.C. loan of $4,750,000. This effort has been held in abeyance, pending the outcome of the plan to partition the road among the other carriers serving the same territory. At the meeting of the officers of the eight roads, a survey of the road was organized, with experts assigned to three phases of the problem of consolidation—engineering, operating and traffic. The survey will determine which parts will not be needed and should be abandoned in the event that the road is allocated among the eight others.

Merger Economies Exaggerated Says Fullerton

Amalgamation of Canada's two great railway systems would not be in the interest of the country, Judge C. P. Fullerton, chairman of the board of trustees of the Canadian National, told a gathering of business men at Halifax, N. S., last week.

The question of amalgamation was not an issue so far as he was concerned, he declared. It had been settled by Parliament. In Judge Fullerton's opinion, when E. W. Beatty, president of the Canadian Pacific, said $75,000,000 could be saved by amalgamation he spoke not from his own knowledge but from what his officers told him, and used figures for 1930. It was difficult to determine what the saving would

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be, he continued, but Canadian National officers had told him it would not be more than $15,000,000.

"If the railways wished to proceed ruthlessly they could of course cut down expenses but it would be by dismissing men, reducing services, abandoning lines and putting men out of work.

Citing a local line of light traffic, he pointed out that such lines were constructed, communities were built and many people were dependent on them. Abandonment in such cases would be impossible.

Despite criticism, he continued, spending on the Canadian National had reduced the costs of operation. In 1920 the road had an operating deficit of $30,000,000. From 1923 on there were no operating deficites and from 1928 on the system paid its operating expenses and the interest on its bonds. When the slump came the revenues were cut in two but that was true of railways all over the continent. The Canadian Pacific was in precisely the same position as the Canadian National and had to go to the Government for assistance.

"Mr. Beatty says that amalgamation will take the railways away from political influence," said Mr. Fullerton. "Perhaps you believe that, but I don't."

"As to extravagance—there was extravagance; there was extravagance in other railways; there was extravagance everywhere; there was extravagance in private lives. But that is all over. The net result is that we will never again have to spend the money that was spent before.

"In the old days when all was going well with the railway, each political party was anxious to claim credit for establishing the railway. It was a great national asset and, so far as I am concerned, I believe it and am going to do my best to hold on to it for Canada."

Bridge and Building Exhibit

Thirty-four manufacturers of materials and appliances used in construction in maintenance of bridge, building and water supply facilities presented exhibits under the auspices of the Bridge and Building Supply Men's Association, at the Sherman Hotel, Chicago, on October 16-18, in connection with the convention of the American Railway Bridge and Building Association.

The officers of the supply association, who were responsible for the preparation and conduct of the exhibit were: President, S. A. Baber, High Grade Manufacturing Company, Cleveland, Ohio; Vice-president, B. S. Spaulding, Fairbanks, Morse & Co., Chicago; Treasurer, B. J. Wilson, Pocket List of Railroad Officials, New York; Secretary, J. W. Shoop, Lehon Company, Chicago; Members of the Executive Committee, L. F. Flanagan, Detroit Graphite Company, Detroit, Mich.; K. T. Batchelder, Insulite Company, Chicago; J. H. Bracken, Celotex Company, Chicago; C. H. Johnson, Fairmont Railway Motors, Inc., Fairmont, Minn.; A. J. Filkins, Paul Dickinson, Inc., Chicago; honorary director, I. B. Tanner, Tanner-Willard Company, St. Louis, Mo.

In the election of officers, Mr. Spaulding was advanced to president; Mr. Shoop was elected vice-president, Mr. Wilson was re-elected treasurer; and Mr. Flanagan was elected secretary. T. G. Windes, National Aluminate Corporation, Chicago, and G. R. McVay, Ruberoid Company, Chicago, were elected members of the executive committee.

List of Exhibitors

Barrett Company, New York; C. M. Timpe and W. F. Doriot.

Binks Manufacturing Company, Chicago; paint spray equipment; J. E. Schabo.

Celotex Company, Chicago; literature and samples of wallboard, hard tile and insulation; D. J. Carmouche, H. A. Winandy and C. W. Young.

Cole Automatic Nutlock Corporation, Elwood, Ind.; nut locks; V. G. Cole and C. H. Prager.

Dearborn Chemical Company, Chicago; sample of rust preventives; E. M. Converse, A. C. Mueller and C. C. Rausch.

Detroit Graphite Company, Detroit, Mich.; literature on rust prevention and paints, and samples of paint colors; Luke F. Flanagan and J. R. C. Hintz.

De Vilbiss Company, Toledo, Ohio; spray painting equipment; George R. Cooke.

Paul Dickinson, Inc., Chicago; smoke jacks, cast iron chimneys, drain heads and ventilators; A. J. Filkins.

Joseph Dixon Crucible Company, Jersey City, N. J.; paints, graphites and graphite products; E. C. Bleam.

Duff-Norton Manufacturing Company, Pittsburgh, Pa.; ratchet and screw bridge jacks; C. N. Thulin and E. E. Thulin.

Fairbanks, Morse & Company, Chicago; catalogs on pumps, turbines, Diesel engines, standpipes, electric motors and motor cars; E. C. Golloday, E. F. Kultchar, W. L. Nies, B. S. Spaulding and C. H. Wilson.

Fairmont Railway Motors, Inc., Fairmont, Minn.; literature on motor cars and work equipment; C. P. Benning, Kenneth Cavins, Arthur Fletcher and C. H. Johnson.

Federal-American Cement Tile Company, Chicago; samples of concrete roof slabs and literature on concrete cribbing; C. Hahn and A. Isherwood.

Hastings Signal & Equipment Company, Boston, Mass.; samples of clearance warnings; R. W. Hastings and Barton Snow.

Hygrade Manufacturing Company, Cleveland, Ohio; roofing cement, calking and glazing compound, and roof renewing compound; S. A. Baber.

Ingersoll-Rand Company, New York; pneumatic tools; R. W. Bailey, G. W. Morrow and D. W. Zimmerman.

Ingot Iron Railway Products Company, Middletown, Ohio; samples of multi-plate pipe and paved invert pipe, literature; E. T. Cross, W. R. Greenawalt and J. L. Young.

Insulite Company, Minneapolis, Minn.; literature and samples of insulation; K. T. Batchelder, O. R. Le Vene and John Shonts.

Johns-Manville Sales Corporation, New York; literature and samples of asbestos board, asbestos roll roofing, asbestos bridge plank, built-up roofing, and waterproofing; C. S. Klingman and T. O'Leary, Jr.

Kaustine Company, Inc., The, Libertyville, Ill.; literature on sanitary facilities; Charles Smale.

Lehon Company, Chicago; samples of liquid asphalt and roofing; Tom Lehon and J. W. Shoop.

Earle A. Mann & Associates, Chicago; streamline pipe and fittings, copper pipe and fittings, valves and paint spray equipment; Earle A. Mann, A. A. Walker and W. F. Weber.

Massey Concrete Products Corporation, Chicago; literature and photographs of concrete highway crossings, culvert pipe and cribbing; Ross Clarke and D. A. Hultgren.

National Aluminate Corporation, Chicago; sodium aluminate, chemical balls, proportioners, and water-treating equipment; P. W. Evans, J. L. Gibboney and T. G. Windes.

National Lead Company, New York; structural paints and anchoring specialties; W. S. Carlisle and Otto Meyer.

George P. Nichols & Bro., Inc., Chicago; photographs of turntable tractors; S. F. Nichols and B. F. Goldman.

Otley Paint Manufacturing Company, Chicago; samples of pigments; E. Van Patten and W. A. Otley.

W. W. Patterson Company, Pittsburgh, Pa.; wood and steel tackle blocks; W. W. Patterson.

Patterson-Sargent Company, Cleveland, Ohio; paints; Geo. W. Anderson and W. H. McBridge.

Pittsburgh Plate Glass Company, Newark, N. J.; paints and waterproofing; F. A. Derfuss, J. G. Mowry and L. F. Theurer.

Pocket List of Railroad Officials, New York; copies of publication; B. J. Wilson.

Railway Engineering and Maintenance, Chicago; copies of publication; E. T. Howson, W. S. Lacher, H. A. Morrison, G. E. Boyd, C. J. Wageman and H. E. McCandless.

Ruberoid Company, New York; asbestos tiling, shingles and roofing; T. N. Dantz and G. R. McVay.

U. S. Wind Engine & Pump Company, Batavia, Ill.; samples of float valves, and literature on tank fixtures and water columns; C. E. Ward.

Construction

Chicago Great Western—An order has been placed with the Ross & White Company, Chicago, for fireproof locomotive sand storage and handling equipment for installation at the enginehouse at West St. Paul, Minn.

Union Pacific.—A contract was recently awarded to Orino, Bell & Malcom, Portland, Ore., for the construction of a portion of the relocated line of the Oregon, Washington Railroad & Navigation Company in the vicinity of the Bonneville dam, a P.W.A. project now under construction on the Columbia river, about 42 miles east of Portland. This contract, which involves an estimated expenditure of $846,247, is confined principally to grading, riprap, tunnel work and foundations for the drainage structure over Tanner creek, all this work being confined to Sections A and C of the line change work. The entire project involves the relocation of 4.26 miles of line in order to raise the track above the water level behind the dam, at a total estimated cost of $2,886,356. The new line will be approximately 660 ft. shorter than the old line, will reduce the maximum grade within limits of the line change from 1.4 per cent to 0.45 per cent, and will decrease the total rise and fall approximately 36 ft. The maximum curvature will be 3 deg. as compared with a maximum of 9 deg. 30 min. on the old line and a total of 209 deg. 39 min. of central angle will be eliminated.

Equipment and Supplies

LOCOMOTIVES

The Waco, Beaumont, Trinity & Sabine is seeking a P.W.A. loan of $260,000 for additional motive power and repairs to its line.

The Lehigh Valley is inquiring for three Diesel electric locomotives of 600 to 800 hp. This is part of the equipment for which this road was recently allotted an additional loan by the P. W. A.

The Chesapeake & Ohio has ordered three pusher locomotives from The Atlas Car & Manufacturing Company, Cleveland, Ohio. The locomotives will be placed in service at its new car dumping coal dock, Presque Isle, (Toledo) Ohio.

FREIGHT CARS

The Lehigh Valley is inquiring for 250 fifty-foot mill-type gondola cars of 70-tons capacity. This is part of the equipment for which this road was recently allotted an additional loan by the P. W. A.

IRON AND STEEL

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 100 tons of struc-

Continued on next left-hand page

RAILROAD DIESELS FOR RAILROAD MEN

One might easily surmise that our 100 years experience designing and building railway equipment could only affect the design of such a new facility as the Diesel locomotive in a very intangible manner.

But such is far from the case. In the Alco Diesel this 100 years experience is reflected:

1st—In securing the maximum amount of availability with the least possible cost.

2nd—In providing for ease and minimum amount of inspection and maintenance.

3rd—In allowing the yearly reconditioning with existing railway facilities.

These particular 3 features of the Alco Diesel are the "something extra" that this 100 years experience has built into the design. They do not show up in the first cost.

But day-in and day-out they save real dollars after the locomotive is yours.

AMERICAN LOCOMOTIVE COMPANY

ALCO DIESEL

30 CHURCH STREET · NEW YORK · N·Y·

tural steel for a bridge at Heafford Junction, Wis., from the McClintic-Marshall Corporation.

THE NORFOLK & WESTERN is in the market for 10,000 tons of 131-lb. steel rail.

MISCELLANEOUS

BOSTON & MAINE—Orders have been placed with the Timken Roller Bearing Company, Canton, Ohio, for the engine truck bearings under the 10 new locomotives now being built for this road by the Baldwin Locomotive Works, and the Lima Locomotive Works. Two self-propelled coaches being built for this road by the St. Louis Car Company will also be mounted on Timken roller bearings and boxes.

Air Conditioning

An order has been entered in the federal district court by Judge Faris authorizing the St. Louis-San Francisco to equip with air-conditioning devices 26 coaches and 2 dining cars at a cost not to exceed $93,672.

Supply Trade

R. R. Lally, who has been for several years manager of sales at New York for the **Globe Steel Tubes Company,** Milwaukee, Wis., has been elected vice-president in charge of eastern sales.

H. A. Stevenson has been appointed Loadmaster distributor for the **Bucyrus-Erie Company,** South Milwaukee, Wis., with headquarters at Detroit, Mich.

Carr Brothers, Inc., New York, has been appointed exclusive agent for the **Baldwin Locomotive Works** for the Republic of Mexico. The sale of Baldwin products and the products of other companies which Baldwin represents in Mexico, will be handled by Carr Brothers' Mexican representative, **P. G. Cheatham,** Carr Brothers de Mexico, S.A., 2-A Venustiano Carranza No. 48, Mexico, D.F.

Frank J. Johnson has resigned as president of the **American Hoist & Derrick Company,** St. Paul, Minn. Mr. Johnson, with **Oliver Crosby,** founded the American Manufacturing Company in 1882, which was reorganized in 1892, as the American Hoist & Derrick Company. **Frederic Crosby,** son of Oliver Crosby, succeeded Mr. Johnson. **Howard S. Johnson,** son of Frank J. Johnson, retains his title as vice-president, and **Harold O. Washburn,** formerly general superintendent, has been appointed vice-president and treasurer to succeed Mr. Crosby.

SEPTEMBER SHIPMENTS of railroad locomotives from the country's principal manufacturing plants totaled 13 as compared with four in August and two in September, 1933, according to reports received by the Bureau of the Census, United States Department of Commerce.

Financial

BOSTON & MAINE.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Farmington, N. H. to Gilford, 25 miles.

CHICAGO & EASTERN ILLINOIS.—*Reorganization.*—The Interstate Commerce Commission has announced a public hearing in the proceedings for the reorganization of the Chicago & Eastern Illinois under the provisions of section 77 of the bankruptcy act, to be held at Washington on December 3, at which there may be presented any plan of reorganization which the debtor, its receivers or trustees, or any group of creditors, being not less than 10 percentum in amount of any class of creditors, are then prepared to present. For the purpose of the hearing parties having a substantial interest in the proceedings will, upon application and for good cause, be permitted at the hearing to intervene. It is expected that a plan of reorganization will be presented by the debtor. After submission of evidence in support thereof opportunity will be given parties to present evidence in opposition to all or any features of that plan. Thereafter other or different plans may be presented, together with evidence in support of and in opposition thereto. Following the hearing, or after the conclusion of any adjournment thereof, the commission will fix a time for filing briefs and upon receipt thereof will render a report in which it will recommend a plan of reorganization (which may be different from any which has been proposed at the hearings), in compliance with subdivision (d) of section 77, which will be subject to further proceedings as provided in that subdivision. The plan recommended by the commission, and, in its discretion, any other plan of reorganization filed as provided in that subdivision, will be submitted to the creditors and stockholders of the debtor for acceptance or rejection.

CHICAGO & NORTH WESTERN.—*R. F. C. Loan.*—Division 4 of the Interstate Commerce Commission, Commissioner Mahaffie dissenting, on October 17 approved an additional loan of $4,138,000 to this company for two years, to be applied to the payment of $3,058,000 of unpaid vouchers, $511,000 of past due taxes, $569,000 of taxes due in December, and $1,139,800 of interest due December 1. The approval is on condition that loans in amount of $5,000,000 owed to Kuhn, Loeb & Co., and associates, maturing October 13, shall have been paid, extended, or refinanced for at least an equal term. The company was required to deliver as collateral a further $13,500,000 of its first and refunding mortgage 6 per cent bonds. On July 31 the company owed $31,409,133 to the R. F. C. and on September 29 the commission had approved an additional loan of $7,357,000, at the same time approving an extension of some of the earlier loans and issuing the necessary finding that the company is not in need of financial reorganization. Commissioner Mahaffie, who had dissented from the reports issued on September 29, as well as from a similar report on October 1 in the case of the New York, New Haven & Hartford, wrote a dissenting opinion in this case, giving his interpretation of the law that Congress expected that government moneys should be used to sustain a financial structure only if the record indicates a reasonable prospect that it can be expected to survive and that "it is not worth while merely to prolong the struggle at public expense." On the basis of present traffic and earnings, he said, the money now lent can hardly carry the property beyond May 1, 1935, and so far as can be seen additional loans will be essential if default is to be avoided at about that time. The argument that it is helpful to the holders of securities of a carrier for it to borrow in order to pay interest to them is unsound, he said, except it be assumed that ultimate reorganization can thus be avoided. He contiuued:

> The majority, as I understand, rely to a great extent on the earnings history of the North Western prior to 1930. And on that, in part at least, reach the conclusion that its debt burden probably can be successfully carried. I think this takes too little into consideration the changes in railroading in recent years. Passenger traffic used to be profitable. It has to a large extent disappeared. What is left is conducted generally at a loss. Trucks are decimating many classes of traffic. And particularly the more profitable. Carriers by water and by pipe line are cutting into the traffic of rail carriers. Increasing efficiency in the use of coal as well as the substitution of other fuel or electric power is reducing coal traffic. The relocation of industry in order to reduce transportation costs is proceeding, and is perhaps the most important factor in decreasing railroad traffic in its relation to general business. A considerable part of railroad property, both road and equipment is no longer of economic value. Some is obsolete. Changes in transportation practices and facilities threaten to render unprofitable additional property. Circumstances such as these make it more difficult to support a capital structure based on the old values. And make it the more necessary that a railroad be in position to replace obsolete units and to take advantage of improved devices and equipment. Increasing costs of conducting transportation and of fuel and supplies add to the difficulty.
>
> While I hope the majority proves correct, I am unable upon the facts before us to join in the findings.

GEORGIA & FLORIDA,—*Abandonment.*—The Interstate Commerce Commission has authorized the receivers of this company to abandon a branch extending from McAdoo, Ga., to Tennille, 56.7 miles.

SOUTHERN PACIFIC.—*Authorization to Acquire Cotton Belt Sustained.*—The Supreme Court of the United States on October 22 announced a decision without opinion sustaining the validity of the orders of the Interstate Commerce Commission authorizing the Southern Pacific to acquire control of the St. Louis Southwestern, which had been assailed by the Missouri Pacific and the Texas & Pacific.

WACO, BEAUMONT, TRINITY & SABINE.—*P. W. A. Loan.*—The receiver has applied to the Public Works Administration for a loan of $260,000 for repairing and reconditioning parts of its line and for additional motive power.

Average Prices of Stocks and of Bonds

	Oct. 23	Last week	Last year
Average price of 20 representative railway stocks..	35.24	35.92	37.80
Average price of 20 representative railway bonds..	74.38	74.44	67.73

Dividends Declared

Philadelphia & Trenton.—$2.50, quarterly, payable October 10 to holders of record September 30.

Norfolk & Western.—Common, $2.00, quarterly, payable December 19 to holders of record November 30.

Continued on next left-hand page

55 miles per hour trailing through a Spring Switch

That's some speed . . . but is it safe?

Of course it's safe and efficient—for facing or trailing moves. The switch is equipped with the "Union" Style S-1 Mechanical Facing Point Lock for Spring Switches.

Simple in design and rugged in construction, this modern device provides a locking plunger which automatically unlocks the switch points when a trailing move is made, and automatically locks the switch points in their normal position upon completion of the trailing move. Mechanically locked for facing point moves.

Ask our nearest district office for details.

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SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

Railway Officers

EXECUTIVE

William Scott Campbell, manager and chief engineer of the Kentucky & Indiana Terminal, with headquarters at Louisville, Ky., has been appointed vice-president and general manager.

Harry W. Dorigan, assistant to the vice-president of the New York, New Haven & Hartford, will, on November 1, become assistant to the president. Mr. Dorigan was born at Taunton, Mass., on November 23, 1895, and entered railroad service with the New Haven immediately after graduation from high school. He commenced his career as a clerk in the auditor of disbursements' office at New Haven, Conn. Subsequently he was transferred to the operating department, working in the office of the superintendent of the Old Colony division at Taunton, Mass., and later in the general superintendent's office at Boston. In 1917 he returned to the auditor of disbursements' office at New Haven, where he was placed in charge of voucher approvals. During the war period, Mr. Dorigan served overseas for 18 months and returned in February 1919, to special accounting work in the New Haven's statistical department. In 1921 he was promoted to division accountant of the New London division, and in 1923 he was transferred in the same capacity to Providence, R. I., returning to New Haven the following year as special accountant. In 1925 he was transferred to the comptroller's office, and in June, 1930, was promoted to assistant to the comptroller. He became assistant to the vice-president in 1933.

Harry W. Dorigan

OPERATING

J. H. Little, superintendent on the Missouri-Kansas-Texas, with headquarters at Parsons, Kan., has been promoted to superintendent of transportation, with headquarters at Denison, Tex., to succeed **T. F. Gardner,** deceased. **E. P. Blount,** trainmaster, with headquarters at Muskogee, Okla., has been promoted to superintendent, with headquarters at Wichita Falls, Tex., where he replaces **F. H. Schaller,** who has been transferred to Muskogee, where he succeeds **C. W. Watts.** Mr. Watts has been transferred to Parsons to replace Mr. Little.

J. C. McFarland has been appointed acting trainmaster on the Oregon-Washington Railroad & Navigation Co., at La Grande, Ore., to replace **J. F. Corbett,** assistant superintendent, who has been temporarily transferred to Albina, Ore.

FINANCIAL, LEGAL AND ACCOUNTING

George T. Carmichael, general auditor for the New York, New Haven & Hartford, with headquarters at New Haven, Conn., has been appointed comptroller.

TRAFFIC

H. E. Martinez has been appointed general agent for the Illinois Central, at Mexico City, Mex., succeeding **J. F. Lecanda.**

Clayton Anderson has been appointed assistant general freight agent for the Mobile & Ohio, with headquarters at St. Louis, Mo., succeeding **J. M. Simon,** deceased.

J. A. McDonald, traffic representative for the Missouri Pacific at Detroit, Mich., has been promoted to general agent at Washington, D. C., succeeding **F. E. Pennington,** who has been transferred to Pittsburgh, Pa., where he replaces **W. R. Wilson,** who has resigned.

W. W. Trimble, division freight and passenger agent on the Missouri Pacific at Ft. Smith, Ark., has been promoted to assistant general freight and passenger agent at Lake Charles, La., succeeding **A. M. Harris. Dixie Hannibal,** general merchandise agent at Little Rock, Ark., has been appointed general agent at Shreveport, La., succeeding **H. W. Haines,** who replaces Mr. Trimble.

ENGINEERING AND SIGNALING

J. E. Vandling, supervisor of the Pittsburgh division of the Pennsylvania has been appointed engineer of the Delmarva division.

OBITUARY

Joseph Hainen, former assistant to the vice-president of the mechanical department of the Southern, died on October 17 at Sibley Hospital, Washington, D. C., of blood poisoning after a short illness. Mr. Hainen, who was 69 years old, retired from active service with the Southern in March, 1923.

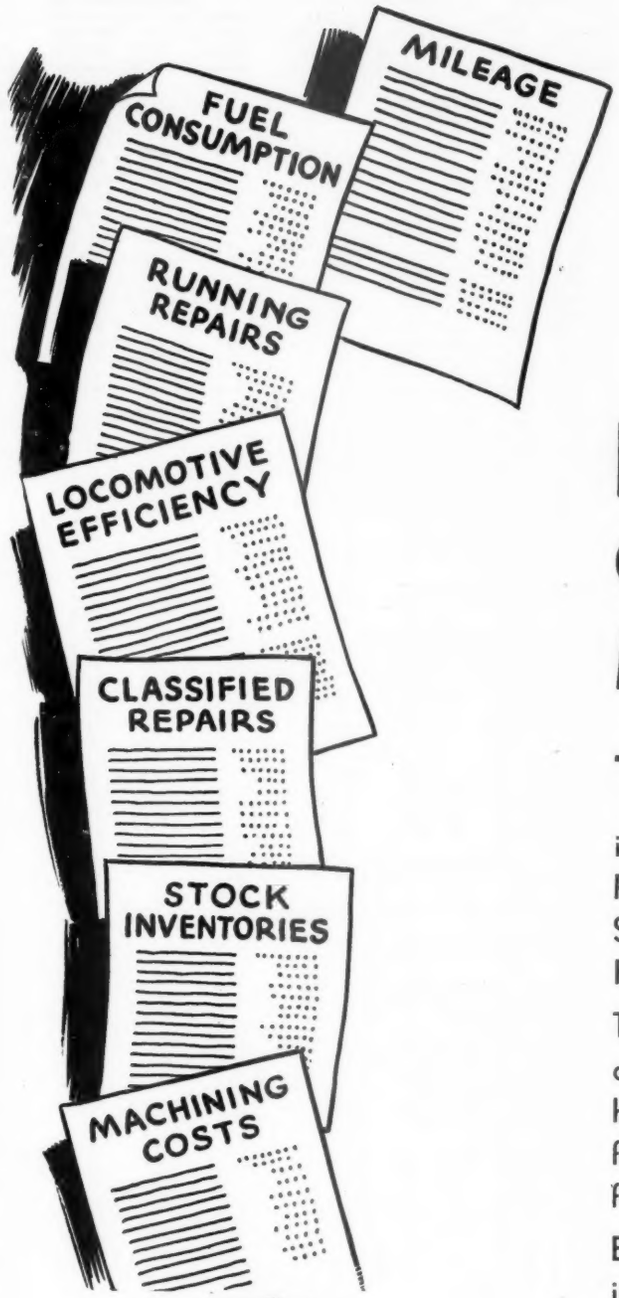
Henry Alfred Bishop, formerly acting vice-president of the Western Maryland and the West Virginia Central & Pittsburgh (now part of the Western Maryland), died on October 22 at his home in Bridgeport, Conn., after a long illness. Mr. Bishop retired from railroad service in 1904. He began in 1881 on the Naugatuck (Conn.) and for 15 years—1887-1902—he was purchasing agent of the New York, New Haven & Hartford.

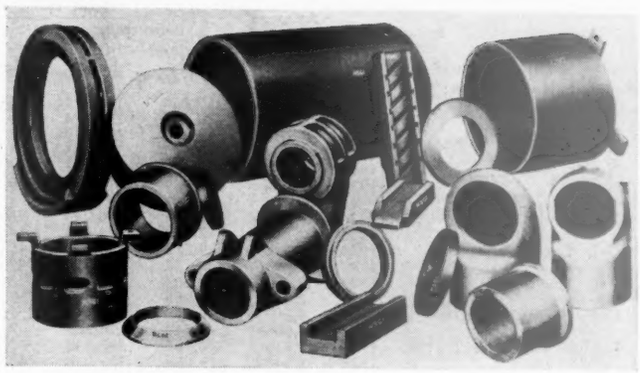
F. M. Dudley, general attorney of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Seattle, Wash., died of a heart attack on October 9, as reported in the *Railway Age* of October 13. Mr. Dudley had been connected with the Milwaukee as general attorney at Seattle, since 1910. He was born on October 28, 1861, at Dixon, Cal., and was educated at the University of California. He entered railway service in 1887, as chief clerk in the legal department of the Northern Pacific, being appointed land attorney in 1888. From 1890 to 1896, Mr. Dudley served as general land attorney on this road, and from the latter year until 1899 he served as division counsel and western land attorney. He was appointed general attorney for the Milwaukee at Seattle on July 1, 1910.

Everett Monroe Harter, president and general manager of the Dansville & Mount Morris, whose death was reported in the *Railway Age* of October 13, was born in Spencerville, Ohio, 67 years ago. At the age of 15 he studied telegraphy in a railroad office and when he was 30 years old he became auditor and assistant treasurer for the Ogdensburg & Lake Champlain at Ogdensburg. He later became auditor and cashier of the El Paso & Northeastern (now a part of the Southern Pacific), with headquarters at Alamogordo, N. M. He served as vice-president and general manager for the Mineral Point & Northern at Mineral Point, Wis. Later he became corporate comptroller of the Detroit, Toledo & Ironton. In 1922 he was auditor and secretary of the Nevada, California & Oregon (now part of the Southern Pacific) in Northern California. In 1925 Mr. Harter came to the Dansville & Mount Morris as receiver and later he became its president and general manager.

Thomas F. Gardner, superintendent of transportation of the Missouri-Kansas-Texas, with headquarters at Denison, Tex., died on September 30, following a heart attack, as reported in the *Railway Age* of October 6. Mr. Gardner was born on August 8, 1874, at Fair Haven, N. C., and at the age of 15 years entered railway service with the Norfolk & Western, as an operator and dispatcher. Later he served as a dispatcher with the New York Central and the Southern, then going with the Katy as a dispatcher at Denison, on August 15, 1897. He was promoted to chief dispatcher on October 25, 1902, and was further advanced to trainmaster on January 5, 1907. On May 1, 1928, Mr. Gardner was promoted to superintendent of the Northwestern district at Wichita Falls, Tex., later being transferred successively to the St. Louis district, Boonville, Mo.; the Parsons district, at Parsons, Kan., and the McAlester district, at Muskogee, Okla. He was located at the latter point at the time of his promotion to superintendent of transportation in 1933, which position he was holding at the time of his death.

Table of Operating Statistics of Railways begins on next left-hand page





HSGI SAVINGS CAN BE FOUND IN MANY RECORDS

THE economies effected by the use of HUNT-SPILLER *Air Furnace* GUN IRON can be found in the records in the offices of Superintendents of Motive Power, Purchasing Agents, Master Mechanics, Fuel Supervisors, Shop Superintendents and Roundhouse Foremen.

These records show greater mileage between renewals of parts, less fuel per ton mile, fewer items on the roundhouse work reports, more efficient performance, fewer failures, lower cost for general repairs, fewer requisitions for materials and decreased machining costs.

Every one of the HSGI parts listed below offers savings in the cost of locomotive operation—the more completely equipped, the greater your operating income.

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Cylinder Bushings
Cylinder Packing Rings
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Valve Packing Rings
Valve Bull Rings
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Dunbar Sectional Type Packing
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Air Furnace

Freight Operating Statistics of Large Steam Railways—Selected Items for the Month of August,

Region, road, and year		Average miles of road operated	Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (thousands)	Car-miles: Per cent loaded	Ton-miles (thousands): Gross Excluding locomotives and tenders	Ton-miles (thousands): Net Revenue and non-revenue	Average number of locomotives on line: Serviceable	Unserviceable	Per cent unserviceable	Stored
New England Region:													
Boston & Albany	1934	402	119,740	123,671	8,236	2,959	68.6	152,190	50,818	62	37	37.4	19
	1933	402	130,966	135,774	9,081	3,396	68.2	172,778	57,961	58	47	44.8	8
Boston & Maine	1934	2,016	252,228	278,339	25,290	8,254	69.2	439,208	162,379	115	159	58.0	16
	1933	2,059	270,913	303,685	31,261	9,119	68.5	490,726	185,353	122	166	57.7	6
N. Y., New H. & Hartf.	1934	2,049	320,536	389,761	16,687	9,953	66.9	526,045	192,517	210	140	40.0	30
	1933	2,044	357,489	432,792	20,335	11,126	65.2	598,338	221,754	213	146	40.6	33
Great Lakes Region:													
Delaware & Hudson	1934	848	198,475	256,044	26,635	6,133	61.8	377,808	166,530	244	30	10.8	155
	1933	848	217,978	294,008	34,422	7,309	60.1	465,076	208,191	251	29	10.5	144
Del., Lack. & Western	1934	992	339,572	375,232	45,527	10,357	65.0	595,319	221,396	182	74	28.7	50
	1933	998	338,187	376,810	49,404	11,146	65.9	631,179	244,358	201	69	25.4	62
Erie (incl. Chi. & Erie)	1934	2,304	642,203	665,843	56,233	26,713	63.0	1,632,413	586,659	330	159	32.6	99
	1933	2,316	711,985	741,377	59,482	28,414	60.9	1,793,771	669,060	295	205	41.1	51
Grand Trunk Western	1934	1,007	210,590	211,445	1,470	5,138	59.2	315,273	103,291	70	72	50.8	..
	1933	1,008	194,742	196,283	2,246	5,091	60.0	306,195	102,624	68	78	53.6	4
Lehigh Valley	1934	1,335	370,762	387,838	37,224	10,514	63.3	644,145	245,753	183	131	41.8	26
	1933	1,341	375,060	393,956	40,906	11,378	63.3	691,254	272,767	168	154	47.9	9
Michigan Central	1934	1,967	366,418	366,824	10,271	11,620	60.5	684,813	221,670	141	42	22.8	40
	1933	1,957	386,614	387,295	14,810	11,761	57.2	715,167	227,520	134	49	27.0	33
New York Central	1934	6,415	1,379,461	1,462,663	108,015	48,758	60.4	3,122,568	1,295,665	572	501	46.7	77
	1933	6,426	1,475,793	1,584,532	108,587	54,629	58.9	3,532,497	1,476,935	544	603	52.6	14
New York, Chi. & St. L.	1934	1,661	454,327	457,929	4,100	14,180	61.5	829,668	285,738	126	45	26.1	28
	1933	1,660	503,271	526,846	5,884	14,237	59.4	863,637	299,456	127	63	33.2	8
Pere Marquette	1934	2,196	305,474	313,443	2,409	7,214	59.6	458,757	171,833	109	41	27.2	15
	1933	2,254	337,854	348,797	3,933	7,574	57.9	498,256	188,957	116	55	32.1	12
Pitts. & Lake Erie	1934	234	66,913	68,561	....	2,734	58.2	235,970	131,715	31	42	56.9	6
	1933	231	77,627	80,195	1,177	2,960	61.5	248,262	142,222	31	40	55.9	2
Wabash	1934	2,445	515,975	521,848	10,616	15,463	64.1	883,046	291,618	164	164	49.9	38
	1933	2,453	500,885	506,623	9,763	15,169	63.3	866,980	288,497	179	169	48.7	23
Central Eastern Region:													
Baltimore & Ohio	1934	6,263	1,306,798	1,554,085	173,440	38,106	60.2	2,579,793	1,122,451	790	533	40.3	191
	1933	6,282	1,468,006	1,791,602	216,111	43,947	59.8	3,102,477	1,433,003	721	590	45.0	79
Big Four Lines	1934	2,655	547,575	564,946	22,082	15,430	61.0	959,671	404,107	178	160	47.3	37
	1933	2,660	634,193	654,537	23,908	18,100	60.4	1,174,632	521,309	235	165	41.3	23
Central of New Jersey	1934	690	132,931	148,801	25,354	4,175	57.9	287,425	130,014	81	91	53.1	26
	1933	692	134,541	152,147	25,758	4,470	57.4	306,273	138,373	109	64	36.9	48
Chicago & Eastern Ill.	1934	939	165,610	165,770	2,779	3,663	63.4	223,968	90,867	49	62	55.6	8
	1933	939	185,115	185,675	2,880	3,773	61.5	244,735	102,276	61	112	64.7	14
Elgin, Joliet & Eastern	1934	446	73,765	74,687	582	1,619	59.7	125,130	59,508	62	27	29.9	14
	1933	446	84,489	85,270	1,131	2,045	58.8	165,154	82,128	70	19	21.9	18
Long Island	1934	396	26,540	27,298	12,901	273	52.9	20,371	7,438	28	28	49.8	1
	1933	396	32,546	33,788	11,456	342	51.5	24,485	9,025	30	21	41.2	..
Pennsylvania System	1934	10,018	2,365,740	2,636,391	292,188	83,151	63.8	5,452,496	2,430,758	1,497	935	38.5	407
	1933	10,082	2,755,511	3,075,569	315,597	95,114	62.4	6,401,694	2,917,391	1,458	965	39.8	276
Reading	1934	1,454	360,245	390,807	40,367	9,905	58.6	708,922	326,224	275	103	27.3	102
	1933	1,454	389,761	421,999	43,496	10,909	58.9	803,227	374,901	271	107	28.2	93
Pocahontas Region:													
Chesapeake & Ohio	1934	3,105	836,917	878,540	33,112	35,359	54.9	2,967,068	1,565,428	438	122	21.8	122
	1933	3,146	879,953	928,611	38,273	38,408	53.6	3,348,409	1,801,647	494	184	27.2	173
Norfolk & Western	1934	2,162	568,401	591,125	24,884	22,215	58.0	1,836,250	939,112	388	38	9.0	152
	1933	2,217	653,340	679,899	30,209	26,159	56.8	2,278,837	1,213,699	409	64	13.5	169
Southern Region:													
Atlantic Coast Line	1934	5,145	457,793	458,846	5,758	9,190	64.6	473,524	162,317	315	133	29.7	84
	1933	5,144	449,200	449,851	5,814	8,518	63.5	455,056	161,101	353	123	25.9	132
Central of Georgia	1934	1,886	218,476	221,421	3,633	4,753	67.4	253,482	92,507	100	41	28.9	..
	1933	1,886	201,719	202,447	3,463	4,406	68.4	236,324	89,803	101	42	29.4	..
Ill. Cent. (incl. Y. & M. V.)	1934	6,616	1,371,127	1,385,443	26,260	32,594	59.8	2,104,171	819,599	561	341	37.8	21
	1933	6,644	1,286,041	1,301,492	22,195	28,840	59.2	1,890,339	741,469	587	343	36.9	14
Louisville & Nashville	1934	5,060	921,354	991,475	20,476	20,311	59.7	1,371,947	631,801	323	304	48.5	35
	1933	5,116	977,912	1,061,270	31,749	21,938	57.1	1,588,693	759,731	326	371	53.2	12
Seaboard Air Line	1934	4,296	442,697	450,714	4,220	9,876	64.0	554,710	199,919	195	81	29.4	22
	1933	4,326	397,056	407,697	2,375	8,895	61.9	520,070	193,072	222	66	22.9	40
Southern	1934	6,599	1,074,911	1,088,477	16,126	24,196	66.6	1,286,462	463,458	589	260	30.6	77
	1933	6,602	1,097,532	1,113,362	18,926	25,034	65.5	1,388,801	523,593	700	217	23.7	195
Northwestern Region:													
Chi. & North Western	1934	8,443	1,044,955	1,111,624	26,616	27,494	61.1	1,638,287	577,458	596	224	27.3	163
	1933	8,443	975,901	1,031,726	24,900	24,247	62.4	1,468,743	509,203	576	233	28.8	139
Chicago Great Western	1934	1,463	255,025	255,701	11,393	7,773	59.9	480,728	166,490	63	35	35.4	5
	1933	1,463	208,606	210,163	13,520	6,547	57.1	420,600	143,723	65	32	33.0	5
Chi., Milw., St. P. & Pac.	1934	11,154	1,355,990	1,436,119	65,590	35,554	59.7	2,207,906	834,843	533	341	39.0	129
	1933	11,215	1,200,564	1,263,422	53,407	31,221	58.6	2,000,211	772,149	663	226	25.5	259
Chi., St. P., Minneap. & Om.	1934	1,653	237,003	250,998	11,808	5,174	65.6	301,378	107,494	119	40	24.9	48
	1933	1,681	213,811	220,829	9,710	4,572	66.3	276,443	107,168	126	27	17.6	59
Great Northern	1934	8,302	801,950	808,048	23,552	26,049	59.9	1,720,495	738,581	424	165	28.0	82
	1933	8,424	671,939	677,265	18,689	22,311	59.7	1,553,546	709,663	464	145	23.8	133
Minneap., St. P. & S. St. M.	1934	4,280	356,707	362,597	3,212	7,953	61.0	464,057	179,142	120	40	24.7	1
	1933	4,291	347,832	352,733	3,517	8,060	63.3	479,419	205,517	126	40	24.2	8
Northern Pacific	1934	6,414	757,422	828,249	55,165	22,961	59.6	1,450,422	530,619	355	110	23.6	17
	1933	6,413	610,063	658,327	44,822	18,523	60.4	1,169,696	453,871	358	168	32.0	42
Oreg.-Wash. R. R. & Nav.	1934	2,150	192,199	200,371	13,310	4,795	65.6	284,712	108,694	91	39	29.9	15
	1933	2,167	157,878	164,220	10,955	3,920	66.9	228,203	90,949	88	39	30.7	25
Central Western Region:													
Alton	1934	921	207,755	218,752	1,593	4,594	58.6	293,326	95,841	54	37	40.2	1
	1933	951	189,514	194,477	2,048	3,920	57.4	256,488	89,317	58	40	40.4	1
Atch., Top. & S. Fe (incl. P. & S. F.)	1934	11,407	1,555,006	1,633,434	66,583	44,299	61.0	2,721,267	852,721	574	322	35.9	115
	1933	11,586	1,312,747	1,411,024	57,464	36,035	62.7	2,201,626	721,521	625	295	32.0	199
Chi., Burl. & Quincy	1934	9,089	1,293,351	1,343,599	40,704	32,685	57.3	1,970,547	748,233	446	119	21.1	5
	1933	9,157	1,108,732	1,141,771	28,880	27,505	57.4	1,692,534	665,828	415	140	25.2	27
Chi., Rock I. & Pac. (incl. Chi., Rock I. & Gulf)	1934	8,316	1,102,786	1,127,653	6,962	25,286	62.2	1,515,558	571,685	418	188	31.0	82
	1933	8,333	975,829	990,747	5,323	20,550	60.3	1,262,891	472,281	456	158	25.7	94
Denver & R. G. Wn.	1934	2,636	316,850	350,148	38,417	7,874	60.7	490,683	172,000	179	43	19.4	10
	1933	2,478	210,482	233,432	27,384	6,383	63.4	390,903	149,560	202	41	16.9	50
Los Angeles & Salt Lake	1934	1,224	163,965	189,173	29,385	4,626	60.4	289,770	107,229	71	23	24.6	5
	1933	1,239	134,493	147,128	15,311	3,461	66.2	203,485	76,812	70	32	31.1	11
Oregon Short Line	1934	2,493	327,176	340,559	19,293	8,296	59.2	516,594	171,352	125	58	31.5	22
	1933	2,470	250,195	266,722	22,670	6,704	61.5	404,216	145,873	123	69	36.0	31
Southern Pacific—Pacific Lines	1934	8,607	1,204,692	1,294,046	134,173	36,432	62.3	2,261,872	773,443	563	284	33.5	141
	1933	8,836	1,000,948	1,065,445	104,693	30,402	62.4	1,868,651	629,193	523	386	42.5	164
Union Pacific	1934	3,768	1,082,152	1,103,195	43,373	36,388	59.6	2,224,679	703,807	304	124	28.9	53
	1933	3,768	792,064	811,635	34,867	29,030	60.1	1,757,811	561,144	359	109	23.3	169
Southwestern Region:													
Gulf, Colo. & S. Fe	1934	1,906	179,257	182,575	2,773	4,725	66.9	277,095	109,428	84	38	31.3	21
	1933	1,943	174,826	175,768	2,537	3,959	65.0	245,843	100,433	88	36	29.0	24
Mo.-Kans.-Texas Lines	1934	3,282	357,807	360,794	4,841	9,683	61.9	574,374	198,740	117	79	40.2	34
	1933	3,282	343,881	346,106	4,648	8,502	62.4	491,556	175,587	166	64	28.0	86
Missouri Pacific	1934	7,330	1,223,290	1,262,854	27,679	32,726	59.5	2,025,046	718,559	414	140	25.3	118
	1933	7,384	1,048,386	1,072,054	24,023	28,042	60.3	1,755,973	661,264	397	162	29.0	130
St. Louis-San Francisco	1934	5,041	677,634	686,202	8,747	15,497	60.7	924,516	343,954	394	89	18.4	138
	1933	5,191	616,791	623,973	7,608	13,393	61.6	819,061	322,064	391	85	17.9	141
St. Louis Southwestern Lines	1934	1,798	203,962	208,228	2,632	4,896	63.4	278,906	98,520	93	35	27.2	17
	1933	1,872	197,313	205,003	2,757	4,277	64.7	244,900	89,230	95	37	28.1	17
Texas & New Orleans	1934	4,433	478,783	478,982	6,581	10,860	63.0	648,214	237,274	240	60	20.1	71
	1933	4,474	439,654	439,751	3,095	9,176	62.8	546,530	197,593	211	96	31.2	54
Texas & Pacific	1934	1,946	238,894	238,894	1,748	7,579	65.5	434,293	150,994	149	83	35.9	81
	1933	1,946	213,209	213,220	1,324	6,117	65.7	365,589	131,137	172	65	27.4	78

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

1934, Compared with August, 1933, for Roads with Annual Operating Revenues Above $25,000,000

Region, road, and year	Average number of freight cars on line: Home	Foreign	Total	Per cent unserviceable	Gross ton-miles per train-hour, excluding locomotives and tenders	Gross ton-miles per train-mile, excluding locomotives and tenders	Net ton-miles per train-mile	Net ton-miles per loaded car-mile	Net ton-miles per car-day	Car-miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles, including locomotives and tenders	Locomotive-miles per locomotive-day
New England Region:													
Boston & Albany.....1934	3,018	3,371	6,389	25.7	21,384	1,271	424	17.2	257	21.8	4,081	150	42.7
1933	4,222	3,441	7,663	32.2	22,225	1,319	443	17.1	244	21.0	4,654	149	44.3
Boston & Maine.....1934	8,804	5,492	14,296	15.2	24,345	1,741	644	19.7	366	26.9	2,599	102	35.7
1933	8,804	8,097	16,901	16.3	24,856	1,811	684	20.3	354	25.4	2,904	102	37.6
N. Y., New H. & Hartf....1934	16,131	8,873	25,004	12.7	24,278	1,641	601	19.3	248	19.2	3,031	103	37.5
1933	15,410	9,772	25,182	10.3	25,674	1,674	620	19.9	284	21.9	3,499	105	40.7
Great Lakes Region:													
Delaware & Hudson.....1934	11,908	2,181	14,089	4.2	26,437	1,904	839	27.2	381	22.7	6,333	106	33.3
1933	11,535	2,878	14,413	4.3	26,905	2,134	955	28.5	466	27.2	7,919	107	37.8
Del., Lack. & Western.....1934	16,901	3,849	20,750	11.6	27,197	1,753	652	21.4	344	24.8	7,200	137	53.1
1933	17,298	4,044	21,342	13.2	27,198	1,866	723	21.9	369	25.5	7,897	126	51.0
Erie (incl. Chi. & Erie)...1934	27,068	11,786	38,854	6.5	41,236	2,542	914	22.0	487	35.2	8,214	91	47.6
1933	32,795	13,774	46,569	6.4	39,931	2,519	940	23.5	463	32.3	9,319	94	51.7
Grand Trunk Western.....1934	4,882	6,086	10,968	15.2	28,774	1,497	490	20.1	304	25.5	3,310	100	48.4
1933	5,411	8,178	13,589	21.2	28,791	1,572	527	20.2	244	20.1	3,283	94	43.7
Lehigh Valley 1934	18,329	4,996	23,325	14.6	30,881	1,737	663	23.4	340	23.0	5,939	131	43.7
1933	18,750	5,644	24,394	21.8	31,256	1,843	727	24.0	361	23.8	6,562	128	43.6
Michigan Central 1934	19,103	19,250	38,353	14.4	33,756	1,869	605	19.1	186	16.2	3,635	99	66.6
1933	24,938	18,470	43,408	12.2	34,220	1,850	588	19.3	169	15.3	3,750	106	70.8
New York Central.....1934	58,252	57,783	116,035	23.8	36,309	2,264	939	26.6	360	22.5	6,515	94	47.2
1933	70,055	62,764	132,819	24.1	36,623	2,394	1,001	27.0	359	22.5	7,414	94	47.6
New York, Chi. & St. L...1934	8,810	6,026	14,836	5.3	32,685	1,826	629	20.2	621	50.1	5,550	93	87.3
1933	9,523	7,044	16,567	6.2	30,954	1,716	595	21.0	583	46.6	5,818	95	90.4
Pere Marquette 1934	11,575	4,365	15,940	3.6	25,183	1,502	563	23.8	348	24.5	2,524	89	68.0
1933	12,480	4,702	17,182	3.1	25,537	1,475	559	24.9	355	24.6	2,704	87	66.3
Pitts. & Lake Erie.....1934	16,069	9,969	26,038	45.1	50,089	3,527	1,968	48.2	163	5.8	18,182	89	30.4
1933	16,083	10,275	26,358	25.1	45,024	3,198	1,832	48.0	174	5.9	19,844	97	36.9
Wabash 1934	14,562	7,965	22,527	4.1	34,096	1,711	565	18.9	418	34.6	3,848	106	52.4
1933	14,998	8,795	23,793	6.0	34,765	1,731	576	19.0	391	32.5	3,794	99	47.9
Central Eastern Region:													
Baltimore & Ohio.....1934	83,479	20,974	104,453	18.0	26,294	1,974	859	29.5	347	19.5	5,781	135	42.1
1933	89,074	28,165	117,239	19.6	26,124	2,113	976	32.6	394	20.2	7,358	140	49.4
Big Four Lines.....1934	15,826	22,556	38,382	13.8	30,883	1,753	738	26.2	340	21.3	4,910	112	56.0
1933	19,781	22,370	42,131	16.9	31,920	1,852	822	28.8	399	22.9	6,321	99	54.7
Central of New Jersey.....1934	16,855	6,560	23,415	35.4	26,688	2,162	978	31.1	179	9.9	6,070	136	32.7
1933	16,581	6,462	23,043	29.4	27,358	2,276	1,028	31.0	194	10.9	6,450	125	33.2
Chicago & Eastern Ill.....1934	4,172	2,489	6,661	13.5	23,944	1,352	549	24.8	440	28.0	3,122	119	48.9
1933	5,885	2,711	8,596	23.2	22,656	1,322	552	27.1	384	23.0	3,514	123	35.2
Elgin, Joliet & Eastern.....1934	9,279	3,016	12,295	21.0	17,528	1,696	807	36.8	156	7.1	4,303	111	27.3
1933	9,487	3,939	13,426	19.6	16,478	1,955	972	40.2	197	8.4	5,940	104	31.3
Long Island 1934	774	2,720	3,494	2.6	6,023	768	280	27.2	69	4.8	606	296	22.9
1933	755	3,581	4,336	.9	6,101	752	277	26.4	67	4.9	735	254	28.3
Pennsylvania System 1934	243,989	46,294	290,283	13.0	32,031	2,305	1,027	29.2	270	14.5	7,827	114	38.8
1933	240,729	57,471	298,200	11.8	31,707	2,323	1,059	30.7	316	16.5	9,335	115	45.1
Reading 1934	35,269	7,043	42,312	9.6	24,704	1,968	906	32.9	249	12.9	7,239	148	36.8
1933	36,251	8,813	45,064	23.1	24,971	2,061	962	34.4	268	13.3	8,319	139	39.7
Pocahontas Region:													
Chesapeake & Ohio.....1934	41,314	11,212	52,526	2.2	50,368	3,545	1,870	44.3	961	39.6	16,265	71	52.5
1933	43,537	10,527	54,064	2.3	51,774	3,805	2,047	46.9	1,075	42.7	18,473	69	46.0
Norfolk & Western.....1934	36,170	4,028	40,198	2.8	47,235	3,231	1,652	42.3	754	30.7	14,009	97	46.6
1933	34,908	4,611	39,519	4.0	51,581	3,488	1,858	46.4	991	37.6	17,657	95	48.4
Southern Region:													
Atlantic Coast Line.....1934	26,512	4,137	30,649	23.0	17,601	1,034	355	17.7	171	15.0	1,018	114	33.5
1933	26,825	3,628	30,453	25.2	17,734	1,013	359	18.9	171	14.2	1,010	117	30.9
Central of Georgia.....1934	6,787	1,980	8,767	27.4	20,708	1,160	423	19.5	340	25.9	1,583	124	51.5
1933	7,063	2,311	9,374	25.0	20,725	1,172	445	20.4	309	22.2	1,536	123	46.4
Ill. Cent. (incl. Y. & M. V.).1934	53,300	15,916	69,216	40.2	25,347	1,535	598	25.1	382	25.4	3,996	123	50.5
1933	53,447	13,762	67,209	31.0	24,167	1,470	577	25.7	356	23.4	3,600	131	45.9
Louisville & Nashville.....1934	48,866	7,040	55,906	33.1	23,684	1,489	686	31.1	365	19.6	4,028	131	52.1
1933	50,256	7,335	57,591	29.5	23,750	1,625	777	34.6	426	21.5	4,790	128	50.6
Seaboard Air Line.....1934	11,530	3,829	15,359	6.7	20,766	1,253	452	20.2	420	32.4	1,501	117	53.2
1933	12,752	3,245	15,997	9.0	20,979	1,310	486	21.7	389	29.0	1,440	117	46.0
Southern 1934	28,338	13,314	41,652	14.3	20,321	1,197	431	19.2	359	28.1	2,265	143	42.0
1933	31,413	18,122	49,535	21.7	20,585	1,265	477	20.9	341	24.9	2,558	143	39.8
Northwestern Region:													
Chi. & North Western.....1934	43,419	20,072	63,491	12.7	24,028	1,568	553	21.0	293	22.9	2,206	115	44.7
1933	44,468	19,385	63,853	10.9	23,040	1,505	522	21.0	257	19.6	1,946	116	42.1
Chicago Great Western....1934	2,312	3,355	5,667	2.6	35,074	1,885	653	21.4	948	73.8	3,671	117	88.1
1933	3,513	2,983	6,496	6.3	34,586	2,016	689	22.0	714	57.0	3,168	118	74.0
Chi., Milw., St. P. & Pac...1934	56,593	15,989	72,582	5.7	25,595	1,628	616	23.5	371	26.5	2,414	114	55.4
1933	58,239	15,432	73,671	4.2	25,815	1,666	643	24.7	338	23.3	2,221	112	47.8
Chi., St. P., Minneap. & Om. 1934	1,994	7,165	9,159	10.0	19,276	1,272	454	20.8	379	27.8	2,098	107	53.4
1933	1,916	6,340	8,256	11.0	19,162	1,293	501	23.4	419	26.9	2,057	104	48.6
Great Northern 1934	41,906	11,936	53,842	7.7	31,768	2,145	921	28.4	443	26.1	2,870	105	45.6
1933	42,788	12,870	55.658	6.1	34,522	2,312	1,056	31.8	411	21.7	2,718	99	36.9
Minneap., St. P. & S. St. M. 1934	16,131	3,261	19.392	4.4	20,653	1,301	502	22.5	298	21.7	1,350	97	73.8
1933	18,871	3,342	22.213	4.1	21,291	1,378	591	25.5	299	18.5	1,545	92	69.2
Northern Pacific 1934	37,175	5,798	42,973	12.7	29,688	1,915	701	23.1	398	28.9	2,669	144	61.2
1933	40,973	4,908	45,881	13.0	29,284	1,917	744	24.5	319	21.6	2,283	138	43.1
Oreg.-Wash. R. R. & Nav..1934	8,118	2,579	10,697	4.7	22,992	1,481	566	22.7	328	22.1	1,630	130	53.3
1933	8,113	3,158	11,271	5.8	22,896	1,445	576	23.2	260	16.8	1,354	139	44.7
Central Western Region:													
Alton 1934	3,252	6,970	10,222	22.5	29,100	1,412	461	20.9	302	24.7	3,356	109	78.1
1933	3,131	6,599	9,730	16.6	27,573	1,353	471	22.8	296	22.6	3,030	113	64.7
Atch., Top. & S. Fe (incl. P. & S. F.).....1934	67,714	8,968	76,682	12.7	32,984	1,750	548	19.2	359	30.5	2,411	100	61.2
1933	68,609	8,039	76,648	13.1	31,211	1,677	550	20.0	304	24.2	2,009	101	51.5
Chi., Burl. & Quincy.....1934	33,700	14,071	47,771	8.7	26,370	1,524	579	22.9	505	38.5	2,656	117	79.0
1933	40,304	13,479	53,783	9.8	25,680	1,527	601	24.2	399	28.7	2,346	114	68.1
Chi., Rock I. & Pac. (incl. Chi., Rock I. & Gulf)....1934	31,160	11,613	42,773	20.2	23,478	1,374	518	22.6	431	30.7	2,218	127	60.5
1933	35,157	10,195	45,352	20.8	21,767	1,294	484	23.0	336	24.2	1,828	131	52.4
Denver & R. G. Wn.....1934	13,554	4,147	17,701	5.1	23,229	1,549	543	21.8	313	23.6	2,105	164	56.5
1933	13,983	3,379	17,362	4.9	27,349	1,857	711	23.4	278	18.7	1,947	152	34.6
Los Angeles & Salt Lake...1934	4,677	998	5,675	10.0	31,175	1,767	654	23.2	610	43.5	2,827	136	74.5
1933	4,097	850	4,947	10.7	27,502	1,513	571	22.2	501	34.1	1,999	141	51.2
Oregon Short Line.....1934	8,731	3,573	12,304	20.9	25,530	1,579	524	20.7	449	36.7	2,217	110	63.7
1933	9,302	3,160	12,462	20.8	26,653	1,616	583	21.8	378	28.2	1,905	112	48.7
Southern Pacific—Pacific Lines 1934	35,287	25,685	60,972	8.7	29,392	1,878	642	21.2	409	31.0	2,899	105	54.4
1933	38,674	22,318	60,992	13.3	28,508	1,867	629	20.7	333	25.7	2,297	106	41.5
Union Pacific 1934	23,932	9,595	33,527	19.4	48,412	2,056	650	19.3	677	58.7	6,026	102	86.4
1933	25,090	8,824	33,914	18.8	49,094	2,219	708	19.3	534	46.0	4,804	101	58.3
Southwestern Region:													
Gulf, Colo. & S. Fe.....1934	8,754	1,555	10,309	9.4	25,038	1,546	610	23.2	342	22.1	1,852	105	49.0
1933	10,650	1,531	12,181	7.6	23,501	1,406	574	25.4	266	16.1	1,667	107	46.5
Mo.-Kans.-Texas Lines ...1934	6,838	3,642	10,480	2.8	28,280	1,605	555	20.5	612	48.2	1,954	82	60.1
1933	10,218	2,846	13,064	7.4	25,282	1,429	511	20.7	434	33.6	1,726	88	49.1
Missouri Pacific 1934	21,267	19,465	40.732	3.8	29,760	1,655	587	22.0	569	43.5	3,162	115	75.1
1933	24,129	18,760	42,889	13.3	28,844	1,675	631	23.6	497	35.0	2,889	117	63.2
St. Louis-San Francisco....1934	22,455	4,895	27,350	7.4	23,585	1,364	508	22.2	406	30.1	2,201	124	46.4
1933	24,538	4,693	29,231	7.4	22,584	1,328	522	24.0	355	24.0	2,001	127	42.8
St. Louis Southwestern Lines 1934	3,605	2,284	5,889	9.0	25,066	1,367	483	20.1	540	42.3	1,767	94	53.0
1933	4,629	1,970	6,599	13.1	22,349	1,241	452	20.9	436	32.3	1,537	100	50.5
Texas & New Orleans.....1934	8,025	9,569	17,594	8.8	23,198	1,354	496	21.8	435	31.6	1,727	89	52.1
1933	8,718	9,657	18,375	7.3	20,842	1,243	449	21.5	347	25.6	1,425	90	46.6
Texas & Pacific.....1934	3,528	4,025	7,553	6.9	27,343	1,818	632	19.9	645	49.4	2,503	84	33.5
1933	4,137	3,814	7,951	7.0	26,596	1,715	615	21.4	532	37.8	2,174	80	29.2

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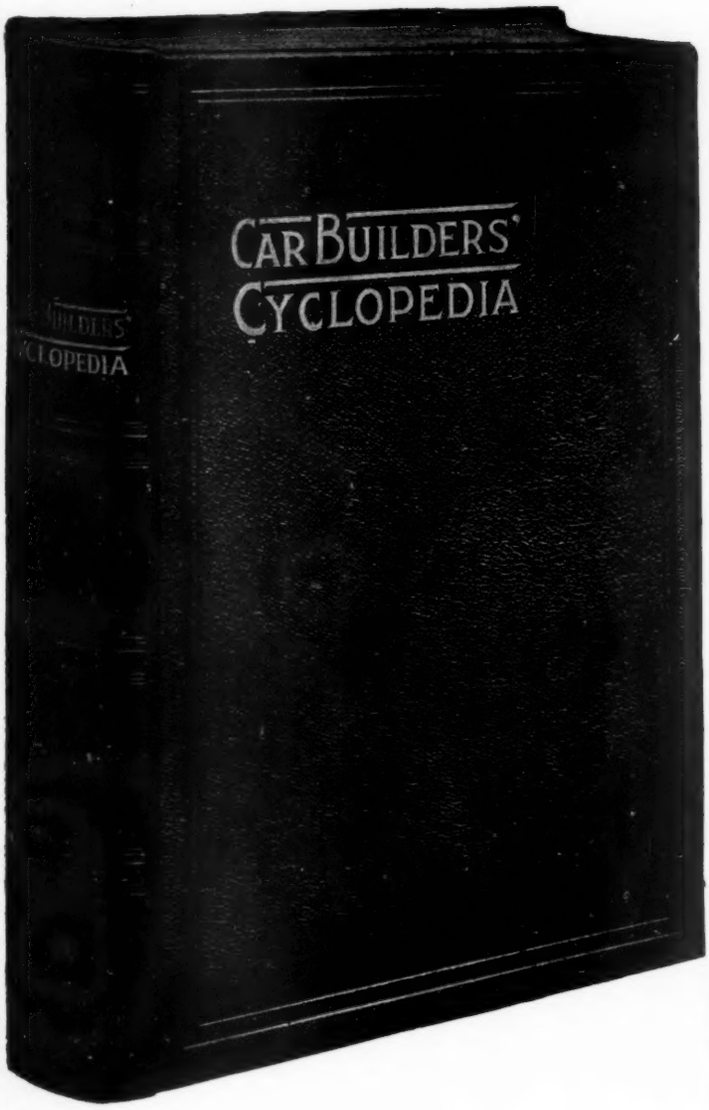

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